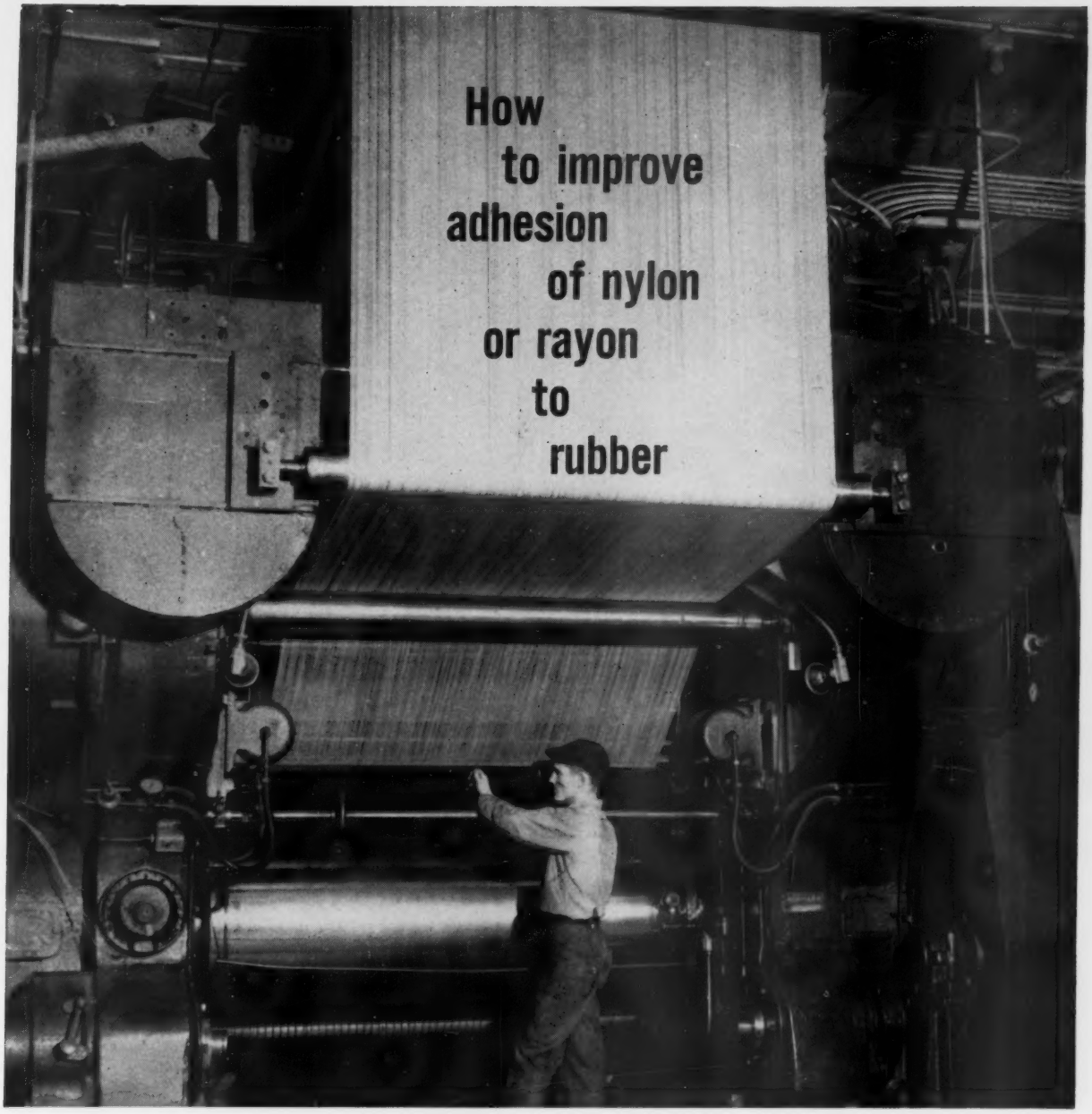

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To get more information about this or other ways you can produce better textiles, often at lower costs, write today for information to Department MC-12, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener Ontario.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

DECEMBER, 1961 VOL. 90, NO. 3

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Generates less heat during mixing – gives excellent dispersion

Lower plasticity – smoother raw stocks!

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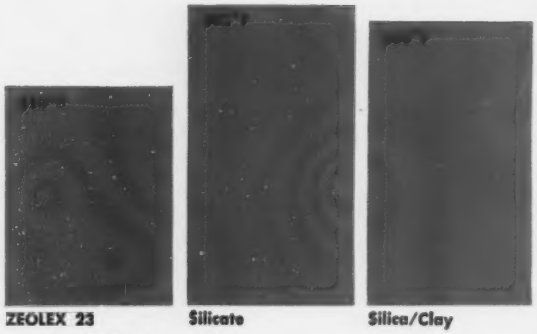

ZEOLEX 23 | Silicate | Silica/Clay

60 p.h.r.—SBR 1502

Mooney Viscosity

ZEOLEX 23	59
Silicate	62
Silica/Clay	81

MS—4' @ 212°F.

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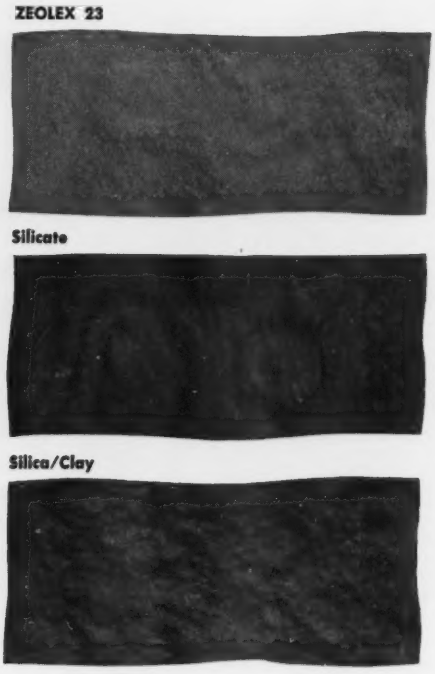

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Highlights Sidelights *of the News . . .*

December, 1961

A new and more comprehensive coverage of foreign news developments pertinent to the rubber industry has been adopted with this issue (pages 393 and 394) . . . Heretofore, foreign news was covered in two separate sections—Overseas—and On The Continent . . . These two sections have now been combined into a new section under the name Overseas . . . Matters covered in this new addition to our publication report all factors, both technical and economic, which will help the American reader better understand foreign activities and markets . . . We hope you will be pleased with our new section and that it will prove informative and helpful.

Readers will also note the re-appearance of our "Man in the News" feature (page 462) . . . Designed to better acquaint rubber industry personnel with some of our leading citizens, the first of this new series of features gives some insight into the life and background of Herman Thies, general manager of the Goodyear Chemical Division.

A number of interesting talks were presented at the 46th annual meeting of the Rubber Manufacturers Association held on November 16 in New York City . . . Ross Ormsby, president of the Association, predicted that total new rubber consumption in 1962 will reach 1,615,000 long tons, some 7½ per cent over present levels (page 448).

Dealings with the U.S.S.R. are again in the news . . . Senator Kenneth Keating (Rep., N. Y.) in recent hearings before a Senate subcommittee, questioned U.S. policy on exports to Soviet Block nations, particularly the sale of 3,800 tons of SBR . . . The Senator stated that it might be a good idea to ban shipments of this nature to the Soviet and to persuade our European allies to do the same (page 450).

Six manufacturers of power cable (Anaconda, General Cable, Phelps Dodge, Okonite, U.S. Steel and Colorado Fuel) have been charged with anti-trust violations by the State of New York . . . The firms were accused of having submitted identical bids on cable to the New York City Transit Authority (page 451).

Carl Harries, a German chemist who provided the first well-defined picture of the structure of rubber hydrocarbons, was installed as the eighth member of the International Rubber Science Hall of Fame at the University of Akron in special ceremonies on November 17 (page 452).

The Fall Meeting of the Southern Rubber Group held on November 17 and 18 in Memphis, Tenn., attracted over 300 members and guests, an all-time high for the group . . . The meeting featured two symposiums—one on compounding and use of latex materials, and the other on designing of colored rubber compounds (page 458).

Chemical Division
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THE GENERAL TIRE & RUBBER CO.

Gentro-Jet's high quality and superior dispersion are evidenced by its excellent die conformity . . . thus, you get a better end product, plus the bonuses of easy and rapid processing at lower cost than by dry mixing. General Tire's steam-whipped black masterbatch, Gentro-Jet, is available in a variety of compositions to meet your every need. It's easy to handle, and it also eliminates the mixing problems common when loose black is involved. Switch to Gentro-Jet now, and reap its benefits!

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Creating Progress Through Chemistry

coming events

Dec. 26-31. American Assoc'ation for the Advancement of Science, Chemistry Division Annual Meeting, Denver, Colo.

Jan. 16, 1962. Ontario Rubber Group, Technical Meeting, Toronto, Ontario, Canada.

Jan. 18, 1962. Quebec Rubber & Plastics Group, Joint Meeting with Society of Plastics Engi- Engineers, Ruby Foo's, Montreal, Quebec, Canada.

Jan. 25, 1962. Washington Rubber Group, National Press Club, Washington, D. C.

Jan. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Jan. 26, 1962. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

Jan. 26, 1962. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Jan. 30-Feb. 2, 1962. Society of Plastics Engineers, 18th Annual Technical Conference, Penn-Sheraton Hotel, Pittsburgh, Penna.

Feb. 2-3, 1962. Southern Rubber Group, Winter Meeting, Statler Hilton Hotel, Dallas, Texas.

Feb. 5-9, 1962. ASTM Committee Week, Statler Hilton Hotel, Dallas, Texas.

Feb. 7-9, 1962. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Statler Hilton Hotel, Dallas, Texas.

Feb. 8, 1962. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

Feb. 23, 1962. Akron Rubber Group, Annual Dance, Sheraton Hotel, Akron, Ohio.

Feb. 23, 1962. Quebec Rubber & Plastics Group, Ladies Night, Victoria Hall, Montreal, Quebec, Canada.

March 2-4, 1962. Boston Rubber Group, Ski Weekend, Hotel Bartlett, Bartlett, N. H.

March 13, 1962. Ontario Rubber Group, Technical Meeting, Kitchener, Ontario, Canada.

March 13-14, 1962. Manufacturing Chemists' Association, Symposium on Packaging of Chemical Products, Chase-Park Plaza Hotels, St. Louis, Mo.

March 16, 1962. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

March 20-29, 1962. American Chemical Society, 141st National Meeting, Washington, D. C.

March 22, 1962. Quebec Rubber & Plastics Group, Technical Meeting, Montreal, Quebec, Canada.

March 23, 1962. New York Rubber Group, Spring Meeting.

March 29, 1962. Washington Rubber Group, National Press Club, Washington, D. C.

April 5, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

April 5, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

April 10, 1962. Ontario Rubber Group, Technical Meeting, Toronto, Ontario, Canada.

April 19, 1962. Quebec Rubber & Plastics Group, Technical Meeting, Montreal, Quebec, Canada.

April 24-27, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Statler, Boston, Mass.

April 26, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

April 26, 1962. Washington Rubber Group, National Press Club, Washington, D. C.

May 4, 1962. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

May 4, 1962. Division of Rubber Chemistry, Chemical Institute of Canada, Niagara Falls, Ontario, Canada.

May 4, 1962. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

May 11, 1962. Buffalo and Ontario Rubber Groups, Joint Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Canada.

May 14-18, 1962. Institut Francais du Caoutchouc, International Rubber Conference, Paris, France.

May 22-25, 1962. Institution of the Rubber Industry, 4th International Rubber Technology Conference, Church House, Westminster, London, England.

May 31, 1962. Washington Rubber Group, National Press Club, Washington, D. C.

June 1, 1962. Quebec Rubber & Plastics Group, Golf Outing.

June 7, 1962. New York Rubber Group, Summer Outing.

June 8, 1962. Fort Wayne Rubber & Plastics Group, Golf Outing, Tippecanoe Country Club, Leesburgh, Ind.

June 8-9, 1962. Southern Rubber Group, Spring Meeting, Dinkler-Tutwiler Hotel, Birmingham, Ala.

June 22, 1962. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 24-29, 1962. ASTM Annual Meeting and Apparatus Exhibit, Hotel Statler, New York, N. Y.

July 20, 1962. Chicago Rubber Group, Golf Outing, St. Andrews Country Club, West Chicago, Ill.

August 2, 1962. New York Rubber Group, Golf Outing.

August 17, 1962. Philadelphia Rubber Group, Annual Outing, Manufacturers Country Club, Oreland, Penna.

Sept. 9-14, 1962. American Chemical Society, 142nd National Meeting, Atlantic City, N. J.

Sept. 20, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Sept. 30-Oct. 5, 1962. ASTM Pacific Area Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles, Calif.

Oct. 16-19, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Sheraton, Cleveland, Ohio.

Oct. 19, 1962. New York Rubber Group, Fall Meeting.

Oct. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Nov. 25-30, 1962. American Society of Mechanical Engineers, Winter-Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 6, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 14, 1962. New York Rubber Group, Christmas Party

Jan. 22-25, 1963. Society of Plastic Engineers, 19th Annual Technical Conference, Ambassador Hotel, Los Angeles, Calif.

Feb. 4-8, 1963. ASTM Committee Week, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Feb. 7, 1963. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

March 31-April 5, 1963. American Chemical Society, 143rd National Meeting, Los Angeles, Calif.

May 7-10, 1963. Division of Rubber Chemistry, American Chemical Society, Royal York Hotel, Toronto, Ontario, Canada.

June 7, 1963. Fort Wayne Rubber & Plastics Group, Golf Outing, Tippecanoe Country Club, Leesburgh, Ind.

June 23-28, 1963. ASTM Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Sept. 8-13, 1963. American Chemical Society, 144th National Meeting, New York, N. Y.

Sept. 10-13, 1963. Division of Rubber Chemistry, American Chemical Society, Hotel Roosevelt, New York, N. Y.

Feb. 3-7, 1964. ASTM Committee Week, Sheraton Hotel, Philadelphia, Penna.

April 28-May 1, 1964. Division of Rubber Chemistry, American Chemical Society, Sheraton-Cadillac Hotel, Detroit, Mich.

Sept. 1-4, 1964. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

May 4-7, 1965. Division of Rubber Chemistry, American Chemical Society, Fountainebleau Hotel, Miami Beach, Fla.

Oct. 19-22, 1965. Division of Rubber Chemistry, American Chemical Society, Bellevue-Stratford Hotel, Philadelphia, Penna.

May 3-6, 1966. Division of Rubber Chemistry, American Chemical Society, Fairmount Hotel, San Francisco, Calif.

Sept. 13-16, 1966. Division of Rubber Chemistry, American Chemical Society, New York, N. Y.

May 2-5, 1967. Division of Rubber Chemistry, American Chemical Society, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Sept. 12-15, 1967. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

GOODYEAR

Photograph taken with cooperation of Globe Rubber Products Corp., Philadelphia, Pa.

Underwater or over the counter– PLIOFLEX Rubber thrives on competition!

The market for swimming accessories made from rubber is big–but so is the competition. The manufacturer that meets the challenge over the counter keeps plant costs and overhead in fighting trim.

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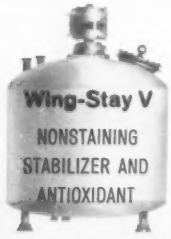
If you want to step up your product's resistance to oxidation, investigate WING-STAY V. Full details plus expert technical assistance are yours for the asking when you write Goodyear, Chemical Division, Dept. L-9419, Akron 16, Ohio.

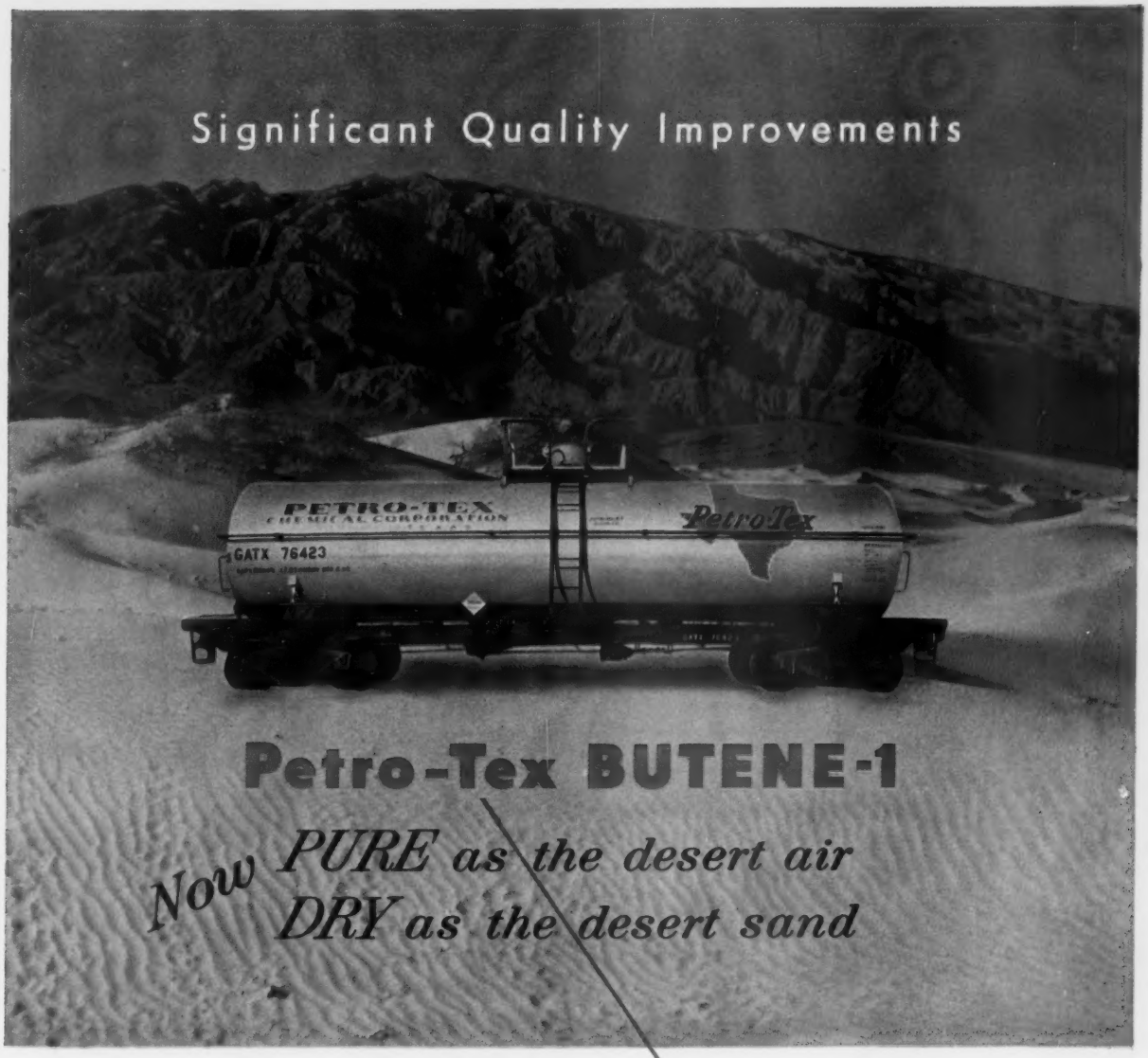


Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

Wing-Stay—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



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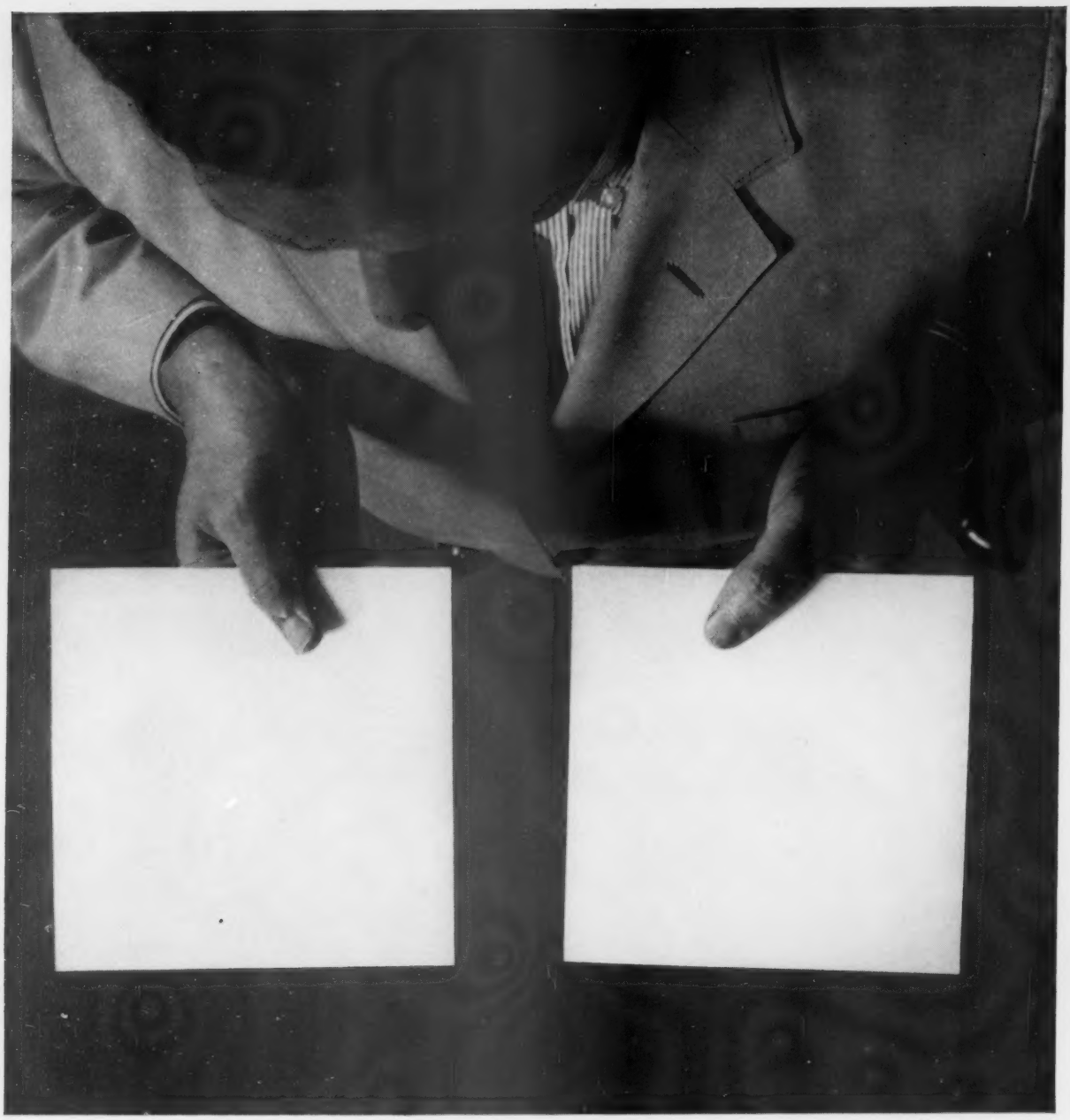

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To all of you we send sincere thanks . . . a Happy Holiday Season and Best Wishes for the New Year.

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Shell chemist removes CL-104 cushion from pin core mold. Read how this new latex can save you money.

SHELL ANNOUNCES A NEW SBR LATEX

Shell Chemical has developed an SBR latex that increases foam products yield as much as 15 per cent. Read about *new CL-104*—and how it can reduce your foam rubber costs. ➞

Shell's new CL-104 latex lets you reduce foam density as much as 15 per cent without sacrificing compression resistance

Shell Research has found a way to build greater strength into SBR latex. As a result, foam manufacturers can reduce the amount of rubber required in foam cushioning. Here's what this discovery can do for you.

SHELL CL-104 is a new SBR latex that can save you money. Here's why:

CL-104 is different from ordinary SBR latex. It's *stronger*. So much so, you can reduce the density of your present foam cushions as much as 15 per cent without losing compression resistance or tensile strength.

These facts are important to foam manufacturers. They mean *lower foam costs*. Because you can reduce foam density as much as 15 per cent, you use less rubber. Or, to look at it another way, with Shell CL-104 you can now make up to 15 per cent more cushions from every tank car of synthetic latex you buy.

Expands foam markets

Shell's CL-104 has dramatic possibilities of expanding your foam markets. In addition to lowering your foam costs, it now lets you offer the *comfort* advantages of *rubber latex foam* to consumers of lower-priced foam products.

No processing changes required

You may be wondering if your plant is set up to use Shell CL-104. Or if any elaborate processing changes are necessary.

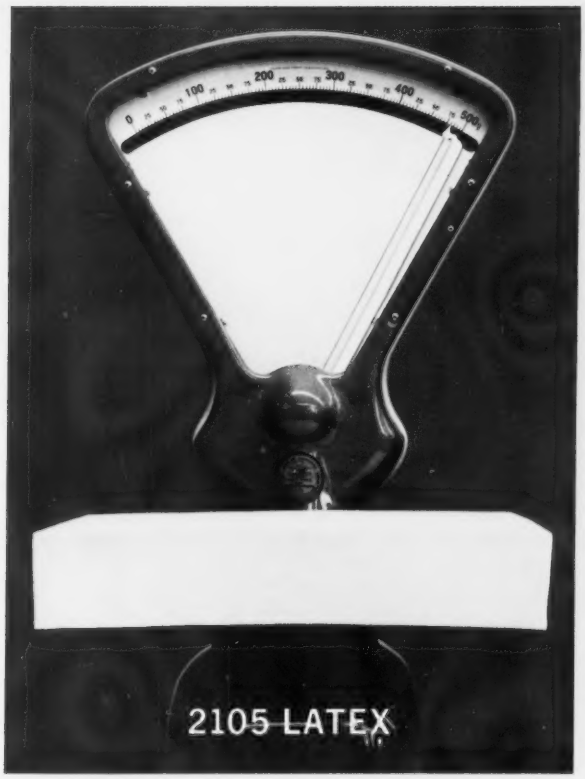
If you are presently using 2105 type latex, you can start using Shell CL-104 latex today. No special processing changes are needed.

Shell CL-104 froths readily, has equivalent gel time, vulcanizes and strips in the same manner as S-2105. It is compatible with natural latex and S-2105 in any ratio.

Handles easily

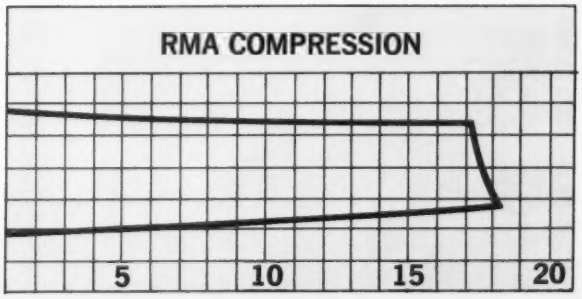
Hundreds of tests in Shell's Torrance laboratories during three years of research confirm its ease of handling in flat stock, standard cushions, and today's new pin core designs.

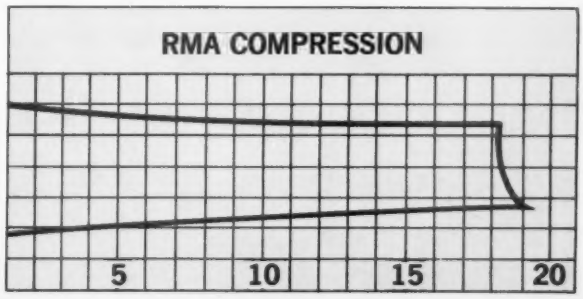
If you would like to try a test run of CL-104 in your own plant, contact your Shell representative. He'll help with all the details, and will show you how to start lowering your rubber latex foam costs.

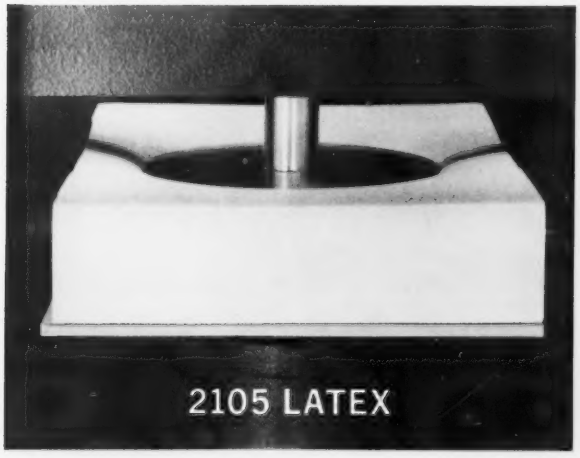


1. Photo above shows foam cushion made of standard 2105 latex. It weighs 480 grams. Photo below shows 2105 cushion registers RMA compression of 18 pounds at 25 per cent deflection.

2. Photo above shows same size cushion made of Shell CL-104. It weighs 405 grams—15 per cent less than the 2105 cushion. Photo below shows this lower density cushion has almost the same RMA compression.

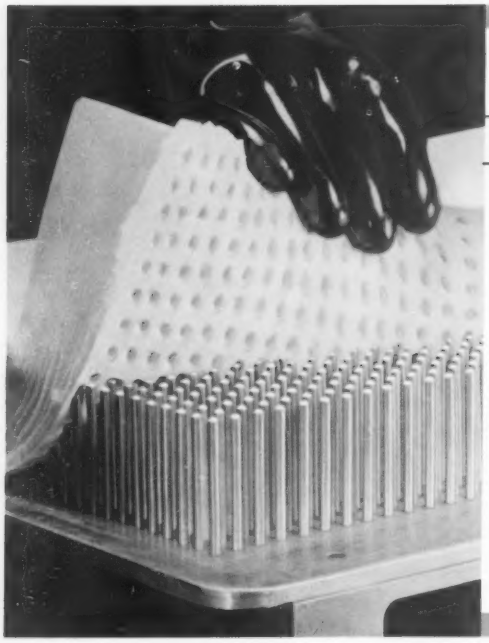






SEE NEXT PAGE FOR PROPERTY CHART AND OTHER DATA ON SHELL CL-104 ⟶

NEW LATEX CONTD.



TYPICAL FOAM PROPERTIES OF NEW SHELL CL-104

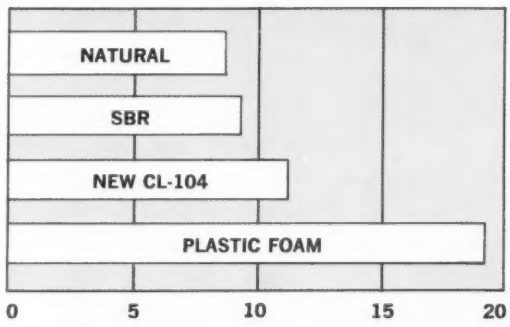
	CL-104	2105
Foam density, lb./cu. ft.	3.8	4.5
RMA compression, lb./50 in.²	18.0	17.5
Tensile Strength, psi	6.0	6.0
Elongation, %	170	200
Hot Wet Tensile Index, psi	3.2	3.0
Hot Wet Elongation, %	900	900
Compression Set, %	12.0	9.0
Volume Shrinkage	12.5	12.5
Flex Resistance, 250,000 cycles @ 77°F. Permanent Set, %	3.0	2.0
Change in RMA compression after flexing, %	−19	−15
Aging, 22 hours @ 212°F. Change in RMA compression, %	+15	+11

TEST FORMULA FOR SHELL CL-104

	PARTS DRY
CL-104	100.0
Sulfur	2.5
Zinc diethyldithiocarbamate	1.5
Zinc salt of 2-mercaptobenzothiazole	1.5
Antioxidant	1.0
Potassium oleate soap	1.0
Trimene Base*	0.75
Zinc oxide	3.5
Sodium silicofluoride	3.0

*Naugatuck Chemical Co.

COMPRESSION SET COMPARISON



Graph compares the compression set of Shell's CL-104 and three other foams after aging 22 hours at 158°F. The RMA maximum specification for foam cushioning is 20 per cent. Notice how CL-104 exhibits good compression set while giving higher compression resistance at a lower density.

How to get samples and technical data on new Shell CL-104

Samples of new CL-104 latex are now available for your evaluation. To receive samples and data, call your Shell Chemical representative, or write one of the three Shell Synthetic Rubber sales offices listed to the right.

SHELL SYNTHETIC RUBBER

P. O. Box 216, Torrance, California

EASTERN	CENTRAL	WESTERN
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Stamford, Connecticut	Cleveland 16, Ohio	Lakewood, California
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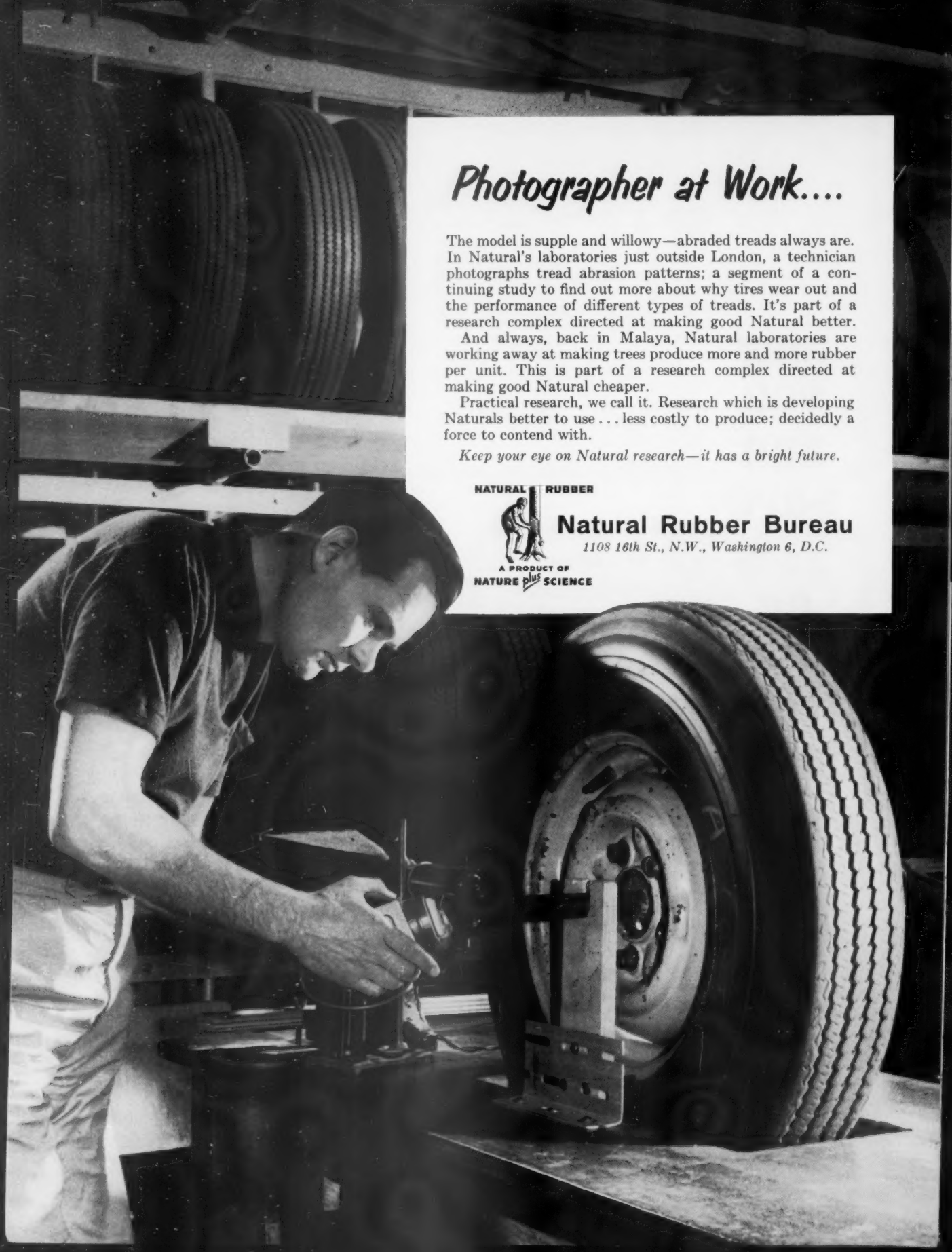
now you can save 25% on every TiO_2 dollar

AND GET HIGHER BRIGHTNESS WITH CYANAMID'S NEW UNITANE® OR-450

It's true!...A dollar's worth of this rutile titanium dioxide, Unitane OR-450, gives a brightness of 77.4 compared to anatase TiO_2 brightness of 74.3. Seventy-five cents worth of OR-450 gives a brightness of 75.4—still higher than conventional rubber grades of anatase, and it does it with significantly less pigment. In a typical white compound, you can reduce pigment content as much as 30.4% over a full quantity of anatase...and still get higher brightness. Result...better products and savings of 25% on every TiO_2 dollar you spend. Unitane OR-450 is ideal for rubber, plastics and floor covering. It offers a bluer undertone than other rutile pigments...masks yellowness more effectively and economically than anatase pigments. Abrasiveness is low, dispersion easy. With Unitane OR-450, you benefit from exceptionally high whitening power and tinting strength. Call your Cyanamid Pigments representative today and arrange for a working sample of this outstanding rutile grade. We're so sure you'll like it we have stocked commercial quantities. Your order will be shipped promptly. *Whiter and Brighter with Unitane.* CYANAMID

AMERICAN CYANAMID COMPANY, PIGMENTS DIVISION, 30 ROCKEFELLER PLAZA, N. Y. 20, N. Y.

NATURAL RUBBER *Research* LOOKS TO THE FUTURE



Photographer at Work....

The model is supple and willowy—abraded treads always are. In Natural's laboratories just outside London, a technician photographs tread abrasion patterns; a segment of a continuing study to find out more about why tires wear out and the performance of different types of treads. It's part of a research complex directed at making good Natural better.

And always, back in Malaya, Natural laboratories are working away at making trees produce more and more rubber per unit. This is part of a research complex directed at making good Natural cheaper.

Practical research, we call it. Research which is developing Naturals better to use . . . less costly to produce; decidedly a force to contend with.

Keep your eye on Natural research—it has a bright future.

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capitol cues

PRESIDENT KENNEDY IS SOFT-PEDALING HIS NEW FRONTIER these days...only temporarily. The pressure of events is forcing him to veer over toward the middle of the road. The Berlin crisis and a Congress that grew increasingly balky at the end of the last session have led him to play down some of his pet projects--the programs that were to give his term so much of its flavor.

> Kennedy regrets the need to go more slowly, but he's always been an intensely practical politician, ready and willing to face reality. So...until foreign and domestic conditions change...you will see new concern about what programs cost.

THE WHITE HOUSE HAS ORDERED CUTS IN NONDEFENSE SPENDING "wherever possible"--to keep the deficit for the current fiscal year from exceeding the $7 billion just estimated. President Kennedy is acutely aware of the danger of inflation and gold losses that rising deficits can bring. But he is discovering--as Eisenhower did before him--that spending is hard to cut.

> The government has lost control of many kinds of spending. Farm aid depends on harvests. GI benefits and debt interest are fixed. And people don't want to trim health research, postal services, or highway work. Some outlays can be cut. but they don't account for a big part of the total. Indeed, rising defense spending also threatens next year's balance.

THE BUSINESS OUTLOOK IS STILL VERY PROMISING, despite the soft spots that have cropped up in the past month or two. More than a few economists were disappointed by the consumer's sluggishness in stepping up his rate of buying. But now they think they see the start of an upsurge in retail sales. So the experts still look for a fast finish to 1961, and good gains in 1962.

> The slowdown that started in September was only temporary. It reflected a combination of negative factors not likely to recur--auto strikes...unseasonal weather...worry over Berlin. Economists now feel the lull began to end several weeks ago.
>
> Recent good business news is adding strength to the earlier confidence in the soundness of this recovery. For example:
> -New orders for durables are the best in more than two years.
> -Personal income is rising and is now $15 billion over 1960.
> -Sales of 1962 autos...vital to all business...started strong.
> -Housing starts have finally turned and now top 1960 by 26%.
> Meanwhile, prices are stable and U.S. spending keeps rising.

ECONOMISTS ARE LIFTING THEIR ESTIMATES OF PROFITS, as one result of the business upturn. The sharp increases in productivity that normally come with a recovery are fattening margins--more so than many businessmen have been realizing. These days, $47 billion is considered fairly conservative for 1961--up $2 billion over 1960. Actually, earnings are doing better than this: In the fourth quarter alone, the rate will top $50 billion a year.

capitol cues (cont'd)

DON'T EXPECT ANY MAJOR TAX ACTION BY CONGRESS next year. During the session that just ended, the legislators were very cool to the package that Treasury officials had proposed. House tax-writers were especially hostile. So the Treasury plans to pull in its horns and ask for only a few changes. Only if these are voted--say, by April--would Kennedy seek broad revision.

> Big tax news of 1962 will be depreciation. Action may come as two fronts. The Treasury will continue to revise present rules, line after line; Secretary Dillon has promised this. Once industry's basic need is being met this way, business will be more receptive to Dillon's 8% credit for investment. And Congress will be sympathetic to industry's point of view.

THE TREASURY WILL COMPLETELY REVISE BULLETIN F, which prescribes the "useful lives" over which many items must be written off. The depreciation periods will be shortened, thus permitting quicker recovery of investment. Conceivably, the Canadian "bracket" system will be adopted--lumping many related items into a single group, with a common useful--and shorter--life.

> Efforts to up-date Bulletin F have been postponed for years by need for revenue. But now the need to spur modernizing--to make industry more competitive--is getting top priority. The revising will be a big, long job. So attention will go first to industries hardest pressed by foreign competition or those centered in areas of high unemployment. Before too long, though, it is hoped the benefits will reach all lines.

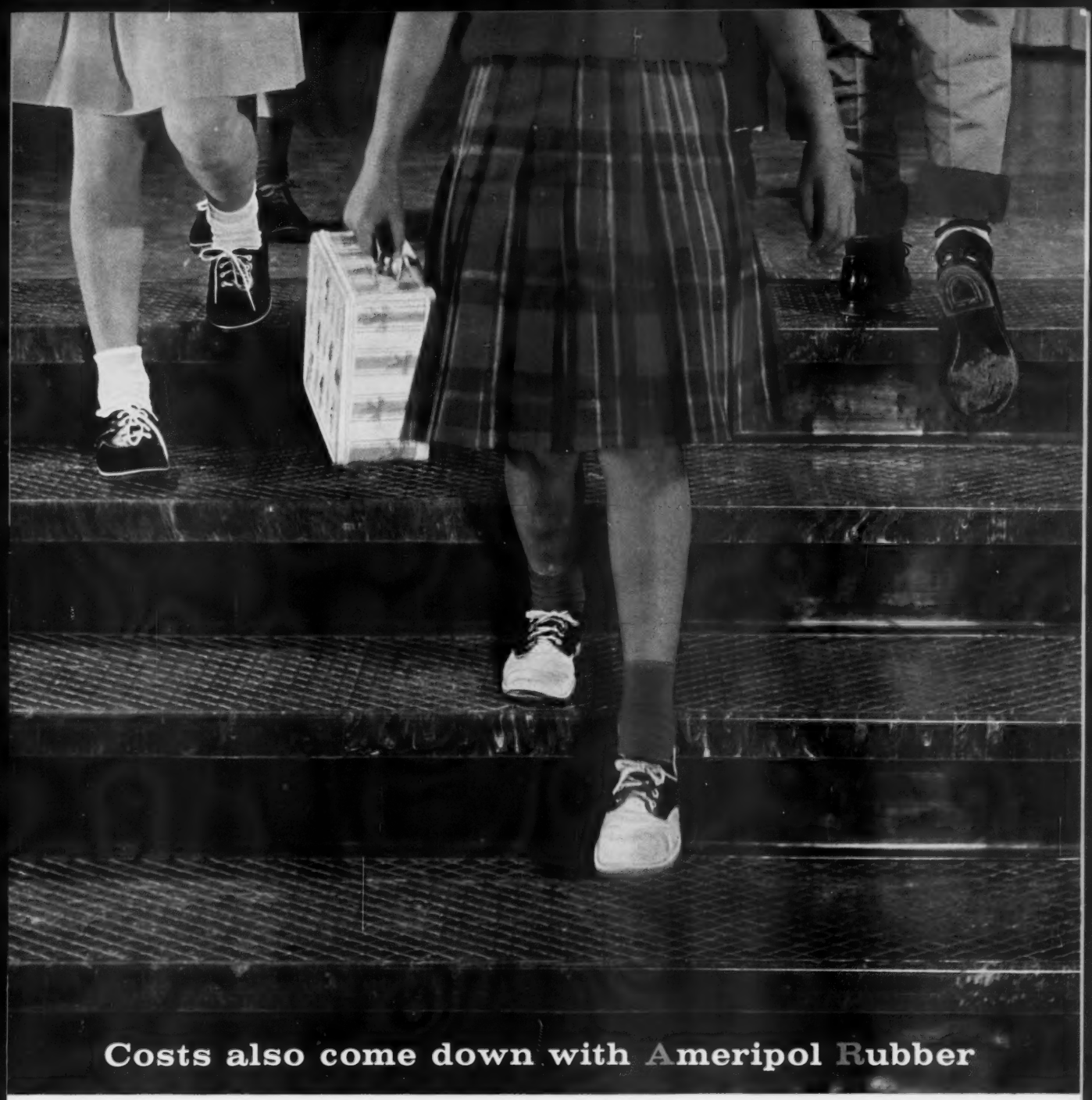
THE LEGISLATIVE TAX PACKAGE THE TREASURY WILL SUPPORT next year will call for some revenue-raisers to offset the income foregone by the proposed 8% tax credit against new investment. The most likely candidates are (1) new rules curbing expense accounts, (2) an end to deferring taxes on foreign-earned income kept abroad, and (3) withholding of dividends and interest.

INCOME TAX RATES WILL NOT BE CHANGED AT ALL--up or down--next year. Cuts are pretty much ruled out by the way the federal Budget keeps rising--mainly for defense. Rising costs even pose red ink in the next Budget year. On the other hand, Kennedy's economic advisers are dead against rate hikes. They fear that higher taxes could check or shorten the business recovery.

> The Keogh bill will die because of the concern over revenue. (This gives self-employed deductions for private pensions.) Backers will try to make the bill acceptable through changes. But Treasury men fear the $350 million-a-year loss involved. They make it clear they'll ask for a veto if the bill passes.

ELECTRONIC PROCESSING OF TAX RETURNS WILL BE INAUGURATED during 1962 by the Internal Revenue Service. Ultimately, every return will be handled. The Atlanta District will be the pilot area, with the system spreading out to other places at intervals. The system will start with returns of 1961. The Philadelphia area will probably be next--1962 returns handled in 1963.

> Business returns will be the first processed. The returns of individuals will be handled a year later in every case. IRS hopes to save time and manpower and catch more evaders.

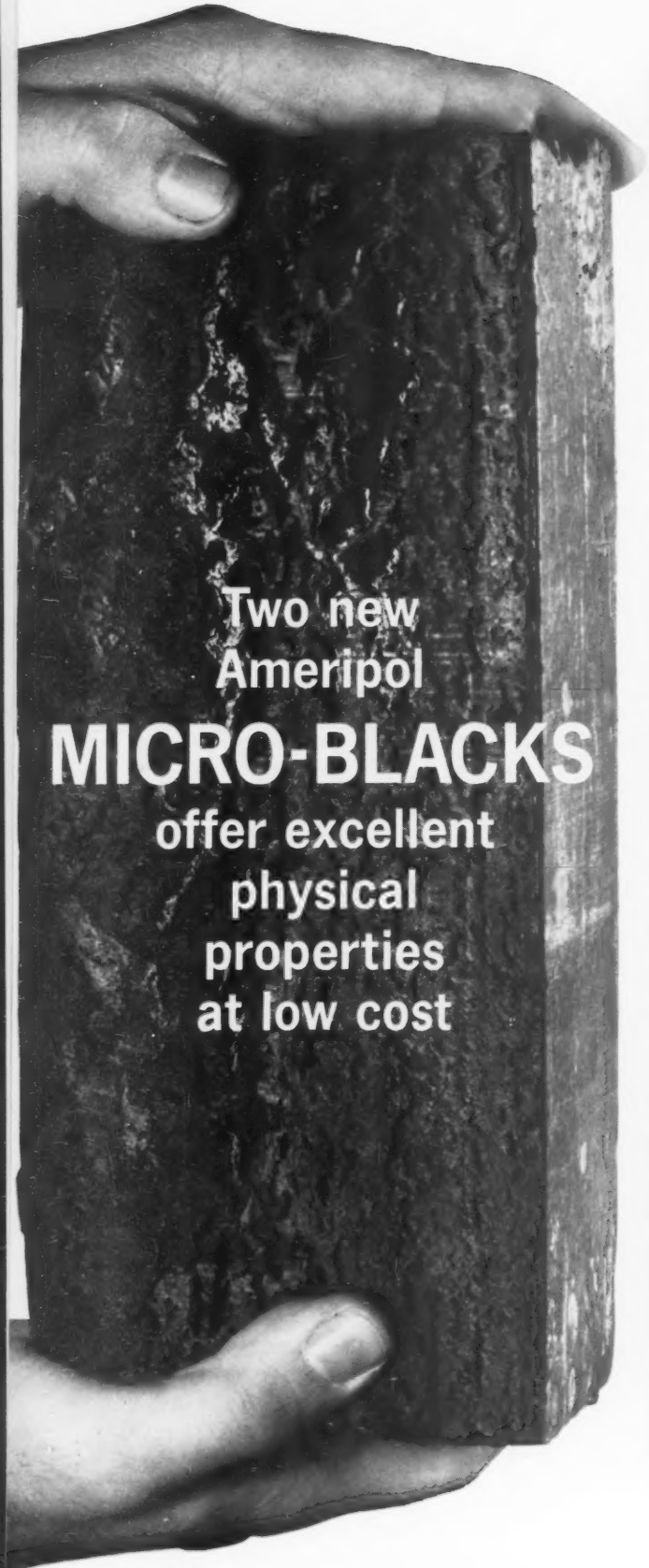


Costs also come down with Ameripol Rubber

These colorful stair treads take a steady pounding in busy buildings, such as schools, motels, offices. So they must be extra thick, resilient, and wear resistant. ■ In order to provide this quality at competitive prices, Johnson Rubber Company turned to one of the new Ameripol polymers developed by Goodrich-Gulf. It provides excellent properties—along with significant cost savings. Being easier to process than rubbers previously used, it has cut mixing time 15%, simplified molding operations, and reduced rejects to the vanishing point. ■ Goodrich-Gulf offers the broadest line of synthetic rubber polymers, backed by continuous product development and alert technical service. It's an excellent recipe for any rubber product manufacturer. For service contact Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland, 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.
WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER



Two new Ameripol MICRO-BLACKS offer excellent physical properties at low cost

Ameripol
THE PREFERRED RUBBER

Two new Ameripol MICRO-BLACK masterbatches, with carbon black finely dispersed in the rubber polymer, offer excellent physical properties and good molding characteristics. They are highly suitable for tire tread stocks and other rubber applications requiring good abrasion resistance.

These two masterbatches, Ameripol 4758 and 4772, have the highest oil and carbon black loading of the Ameripol MICRO-BLACK line, thus per-pound cost is at a minimum. Both MICRO-BLACKS are extended with highly aromatic oil; one uses ISAF black, and the other HAF black.

As with other Ameripol MICRO-BLACKS, excellent dispersion is obtained by high shear agitation, bringing latex, oil, and carbon black into intimate contact immediately before coagulation. This unique feature improves quality of the end product.

COMPOSITION OF MASTERBATCHES IS:

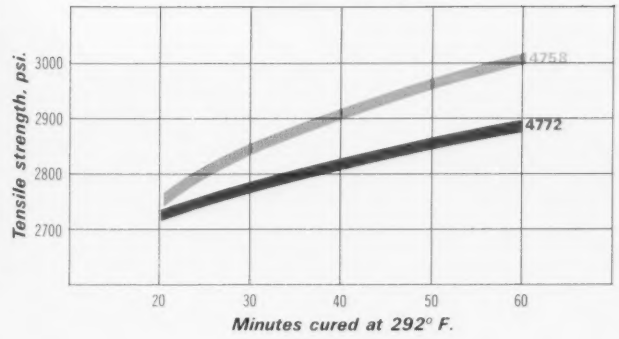
	Ameripol 4758	Ameripol 4772
Base Polymer Latex	100.0	100.0
Highly Aromatic Oil	62.5	62.5
ISAF Black	82.5	—
HAF Black	—	82.5
TOTAL	245.0	245.0
Specific Gravity (Calculated)	1.14	1.14

TYPICAL PROPERTIES
(Standard Test Recipe)

CHEMICAL	Ameripol 4758	Ameripol 4772
Volatile Matter, %	0.31	0.22
Ash, %	0.17	0.09
Mixed Acid, %	2.90	2.74
Soap, %	0.06	0.04

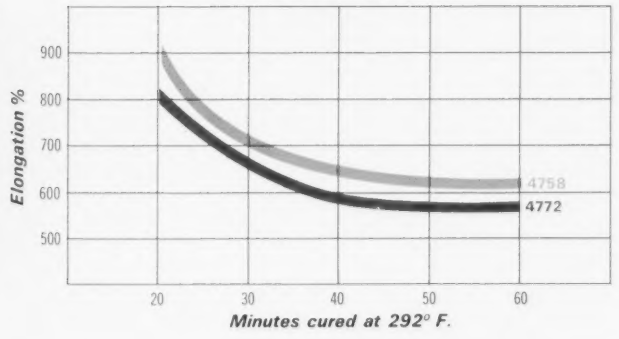
PHYSICAL	Cure @ 292°F	Ameripol 4758	Ameripol 4772
Tensile, psi	50′	3030	2980
Elongation, %	50′	660	710
Modulus @300%, psi	25′	630	640
@300%, psi	50′	1060	1050
@300%, psi	100′	1380	1320
Hardness, Shore A		61	58

TENSILE STRENGTH



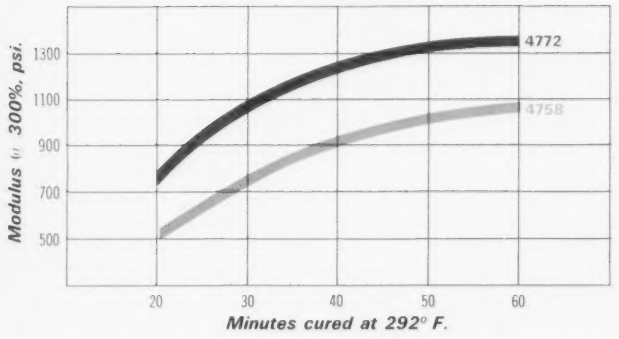
Minutes cured at 292° F.

ELONGATION



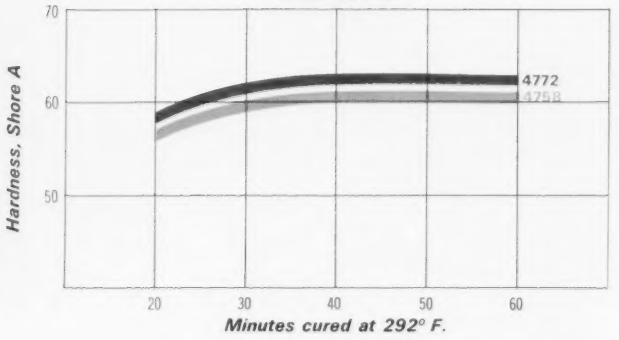
Minutes cured at 292° F.

MODULUS



Minutes cured at 292° F.

HARDNESS



Minutes cured at 292° F.

TEST RESULTS SHOW EXCELLENT PHYSICALS

Below are two typical tread recipes employing Ameripol 4758 and Ameripol 4772. Test results on these formulations show superior physical properties.

TEST RECIPE

	A	B
Ameripol 4758	150.75	—
Ameripol 4772	—	150.75
Zinc Oxide	3	3
Stearic Acid	1	1
Agerite Resin D	0.50	0.50
Resinex	5	5
Santocure	1	1
Sulfur	1.75	1.75
TOTAL	163.0	163.0

PHYSICAL PROPERTIES

	292°F	Ameripol 4758	Ameripol 4772
Tensile, psi	20′	2765	2735
	30′	2850	2785
	40′	2905	2755
	60′	3015	2890
Elongation, %	20′	900	820
	30′	705	665
	40′	645	585
	60′	635	575
Modulus @300%, psi	20′	515	765
	30′	670	1065
	40′	1000	1230
	60′	1075	1325
Hardness, Shore A	20′	57	58
	30′	60	61
	40′	61	62
	60′	61	62
Pico Abrasion		96.5	89
Compounded Viscosity, ML-4 @212°F		47.0	47.0
Mooney Scorch @250°F. T3		30+	30+

Goodrich-Gulf Chemicals, Inc.
WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

Goodrich-Gulf offers widest range of styrene-Butadiene rubber polymers

AMERIPOL TYPES AVAILABLE

Hot polymerized types: 1000, 1001, 1002, 1006, 1007, 1009, 1011, 1012, 1013

Cold polymerized oil-extended types: 1703, 1705, 1707, 1708, 1710, 1712, 4700

Cold polymerized types: 1500, 1501, 1502, 1503, 1509, 1511, 4604

Cold polymerized black masterbatch types: 1605, 1606, 1608, 1609, 1610, 4651, 4658

Cold polymerized black masterbatch oil-extended types: 1805, 1808, 1809, 1816, 4756, 4758, 4759, 4760, 4771, 4772

Forms available: Pressed rubber bales, crumb rubber. Packaging to suit requirements.

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New 18" x 15" roller-head extruder designed for short-cycle delivery of discharge from a size 11D Banbury in continuous sheet.

FARREL

announces another proved means of handling Banbury® mixer batch discharge

These new roller-head extruders were developed by Farrel to eliminate die resistance and resultant increased stock temperatures. Actually the temperatures are considerably reduced. As a result, these machines are ideal for handling finish-mix, heat-sensitive batches from Banbury mixers.

The units consist of an extruder with a slot head that feeds directly into the bank of a two-roll calender. The roller-head die or calender rolls can be cooled as required.

Other advantages include easy cleanout and uniformity of stock quality. Short-cycle Banbury production can be accommodated.

Initial installation was in a tread plant, where results have been highly successful. Subsequent machines, for other applications, have performed equally well.

Now, with Farrel mills, pelletizers, cone-die extruders and the new roller-head machines, there is a wide choice of means for handling Banbury discharge. Ask for a quotation on a unit to meet your requirements.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

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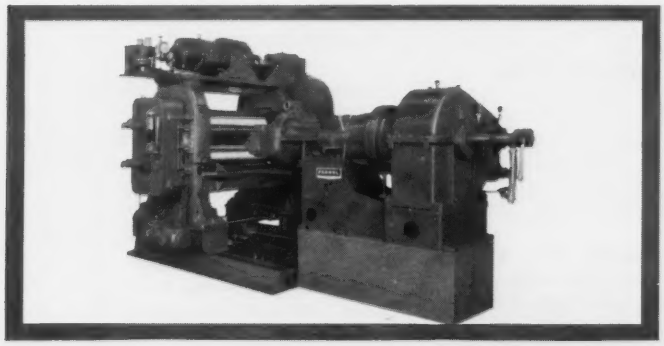
European Office: Piazza della Republica 32, Milano, Italy



FARREL®

This strip-feed 8½" extruder feeds directly into a 16" x 42", 2-roll calender for production of slab material ranging from ⅛" to ¾" in thickness. The head is arranged to move to and from the extruder on a sliding base through an air-hydraulic operating system.

FB-1233

For Molding Accuracy,
Low Costs and
Maximum Usable Production

INSTALL
Stewart Bolling SLABSIDE PRESSES

CAST STEEL CYLINDERS
•
MACHINED FRAMES
•
NO WELDMENTS
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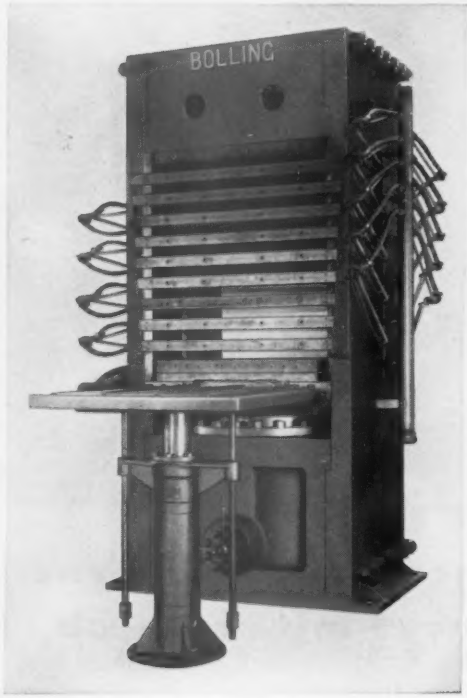
MINIMUM DEFLECTION



1000-ton, 10-deck rubber slab sole press, 42″ x 42″, 2000 p.s.i. operating pressure. Range of sizes and capacities offered.

Meet close tolerances with a Bolling slabside press. Bolling slabside design places strength where needed in order to avoid deflection and assure the highest percentage of usable production. Bolling slabside presses are available from 20″x20″ through 48″x48″. The tonnage span is from 100 to 1250. Bolling also designs and builds a complete range of 4-bolt presses, full- and semi-ring presses, hydraulic pumping units and lift tables.

Stewart Bolling also builds a complete line of intensive mixers, mills and calenders for production and laboratory requirements.

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Intensive Mixers • Calenders • Mills • Refiners • Crackers • Dust Grinders • Sheeters
Hydraulic Presses • Pump Units • Elevators • Bale Splitters • Gears • Reducers • Extruders

News in Brief

► The Automobile Manufacturers Association, 320 New Center Bldg., Detroit 2, Mich., has issued the third edition of Standards For Automotive Service Instructions in Schools which identifies good practices for schools providing instruction in the field of automotive mechanicals and teacher education.

► St. Joseph Lead Co., Monaca, Penna., has issued Technical News, Rubber No. 2 which is a resume of the functions and properties of the firm's various grades of zinc oxide for natural and synthetic rubber latex compounding.

► A four page technical manual describing experimental nitrile silicone fluids has been made available by the Silicone Products Department, General Electric Co., Waterford, N. Y. Ask for Technical Data Book No. 21.

► Features, typical properties and test specifications for Electroset S/E irradiated polyofin wire are available in a two page bulletin published by Radiation Materials, Inc., Long Island City, L.I., N. Y.

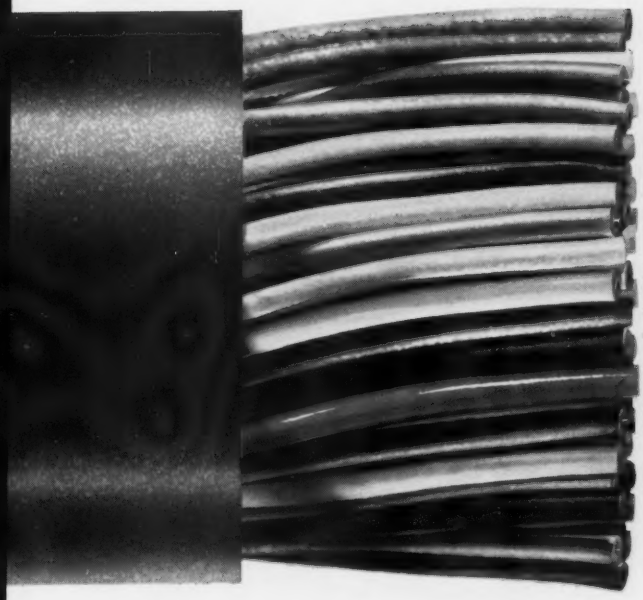
► B. F. Goodrich, Akron, Ohio plans to enlarge and remodel about half of the 151 Rayco stores it recently purchased. An average of $40,000 has been allocated to each of the 73 stores.

► A new guide to electrically heated matrices offering helpful information to retreaders has been made available by the Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y.

► Gross Marketing Corp., Monrovia, Calif., has added a ⅜-inch size to its present 5/16-inch size of Outside-In Seal plugs for repairing nail holes in tubeless tires.

► Avisun Corp., Philadelphia, Penna., has completed initial equipment testing of its 100-million per pound per year polypropylene plant, located in New Castle, Del.

► Precision Equipment Co., 4411E Ravenswood Ave., Chicago 40, Ill., is offering a reference table for engineers and other executives in wall chart form.



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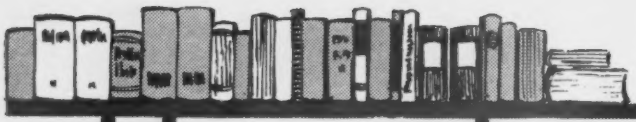

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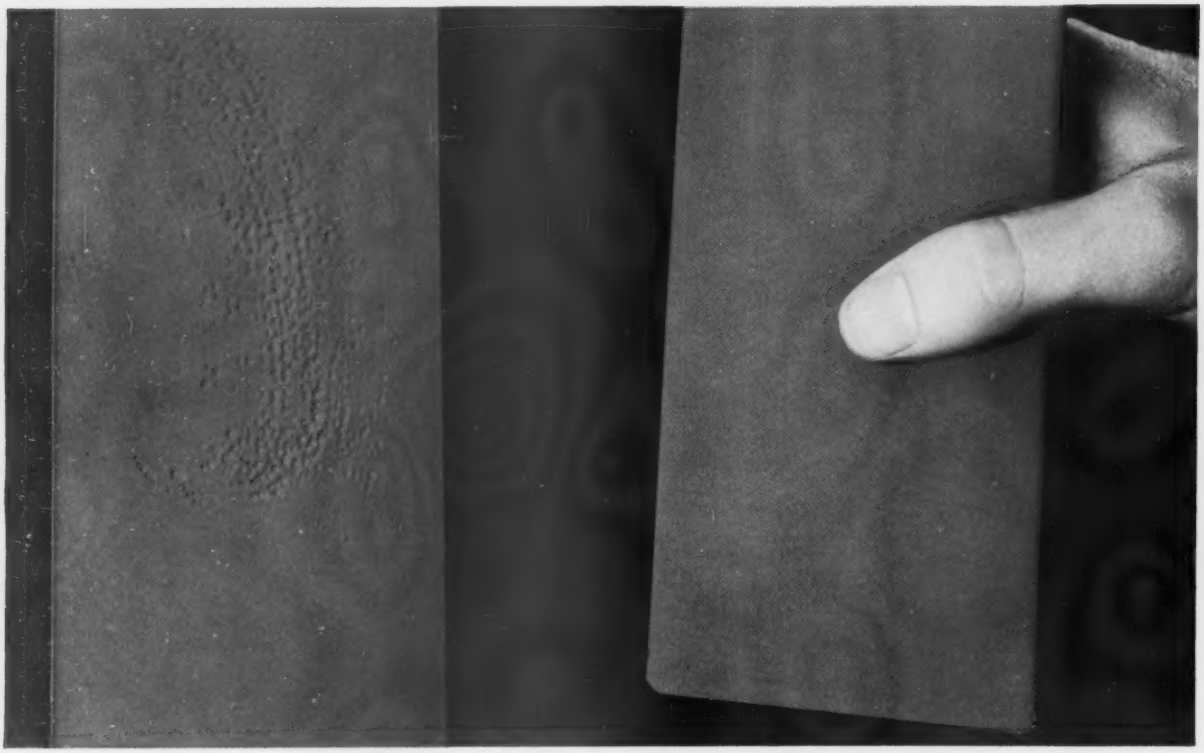

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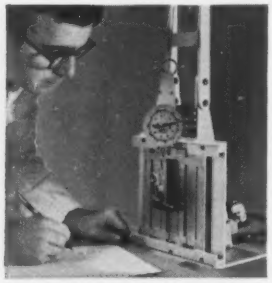

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• **Contracts in Ceylon.** With the completion of contract negotiations in China, and a new contract for sales in 1962 with Poland, Ceylon has announced the suspension of its free market for sheet rubber. The effect of the ruling, by the Commissioner of Commodity Purchase for the Ceylonese Government, is that all rubber shippers will have to sell to him, to enable him to meet the country's obligations under the two contracts. While this decision was welcomed in rubber circles (it means a ready market is virtually assured for almost the entire production until the end of 1962), the U.S. and English shifts in their stockpile policy were greeted with a different reaction. Strong protests were lodged with the Governments of the two countries against what Ceylonese officials called "indiscriminate sales of rubber" from their stockpiles, "which tend to disrupt rubber markets unduly and depress prices to an uneconomic level."

The protest is partly a result of a decline in the rubber prices, which are now at such a low level that the government has decided to discourage the planting of new rubber land because of the bleak future it foresees.

Ceylon has also prevailed on other Asian rubber-producing countries, such as Malaya and Indonesia, to make similar protests.

The new planting policy forbids cultivation of new rubber without prior sanction of the Minister of Agriculture and Lands. The government pessimism about the future of rubber is not shared by the planting interests. They point out that the answer to the problems connected with Ceylon's export crops is not to prohibit planting of more rubber, but to concentrate on the better yielding strains, and at the same time to find new markets among friendly countries with whom Ceylon has trade agreements.

• **Russian Research Activity.** A survey of chemical literature growth by the director of Chemical Abstracts Service would indicate that research activity on chemistry and chemical engineering by the USSR will overtake U.S. efforts by 1965 if the growth rates in both countries continue at their present pace.

During 1960 a total of 132,159 papers was published in all countries. Of this total, U.S. research accounted for just over 27 per cent, the highest of any country. Soviet research accounted for slightly over 19 per cent, followed by the British Commonwealth with nearly 14 per cent. As measured by the abstract service, the total number of papers produced by the USSR and other Soviet Bloc countries (including Communist China) represented a combined total of 26.5 per cent of all papers published in 1960.

• **West German Rubber Industry Expands.** The West German rubber and rubber products industry continued to expand rapidly in 1960. Production of rubber products showed a 16.5 per cent increase and synthetic rubber production a 66.9 per cent increase over 1959. By value, tire and tire products represented the single most important item leading both import and export totals. The value of imports of rubber products in 1960 was about $41 million, and that of exports about $99 million.

Exports of rubber goods increased 18 per cent in 1960 over 1959 and imports rose nearly 41 per cent. Customers for German rubber goods are principally neighboring European countries who absorb more than half of the total exports.

West German imports of rubber products from the U.S. amounted to a few million dollars in 1960. About $21 million worth of synthetic rubber was imported from the United States, making the total 1960 balance of trade in rubber and rubber products heavily in favor of the United States.

West German exports of rubber products to the United States decreased slightly from $3.6 million in 1959 to $3.4 million in 1960. Passenger and bicycle tires constitute about 30 per cent of these totals.

Production of West German synthetic rubber increased from 48,656 tons in 1959 to 81,073 tons in 1960. Total synthetic rubber production capacity is currently over 150,000 tons, and is programmed to slightly over 200,000 tons. This capacity, when it actually becomes production, may affect imports from the United States.

In the short run, West German rubber tire production in July, 1961 was lower than the June total but still higher than in July of last year. Total units of car tires were 1,031,000 for July as against 1,203,000 for June. Total tonnage of rubber for both tires and other hard and soft rubber goods amounted to 39,296 tons during the month.

Imports of natural rubber and rubber sole crepe during June totalled 10,635 tons. Imports of synthetic rubber in June totalled 4,617 tons, of which 2,202 tons came from the United States, 901 tons from Canada, and 537 tons from France.

• **Action in Norway.** A technical assistance agreement for the manufacture of tires and other rubber products has just been announced by Firestone and Aktieselskabet Askim Gummivarefabrik, a firm in Askim, Norway. The Norwegian firm will continue to build tires under the Viking brand, and will assume manufacturing of Firestone tires. Firestone has its own outlets in Norway for the distribution of tires

and other products which will now be manufactured for them by Askim.

The agreement provides that the Akron company will send technical coordinators to Norway so that Firestone methods of production will be followed. The Norwegian firm, established in 1920, is one of the most important industrial companies in that country. It currently employs some 1,700 workers in the main plant, near Oslo; it is the only manufacturer of tires in that country, and has a total of three plants, with some 3,000 employees.

• **And in South America.** The announcement above came on the heels of a similar one, this between Firestone and the largest industrial concern in Uruguay making tires and rubber products. This firm, Fabrica Uruguaya de Neumaticos, S.A. (FUNSA), employs about 2,500 and has been in operation since 1936. The technical assistance agreement stipulates that FUNSA will continue to build tires under its own name as well as manufacture Firestone tires. Firestone is also opening its own distribution outlet in Montevideo to distribute tires and other products thus manufactured. Contracts state that the U.S. firm will provide technicians for the plant to facilitate production of the Firestone products. Uruguay is one of seven nations which are members of the potential Common Market of South America. The organization, patterned after the European Common Market, also includes Argentina, Brazil, Chile, Mexico, Paraguay, and Peru.

In Argentina, plans have now been completed for the purchase by Hooker Chemical Corp. of 50 per cent of the stock of a Buenos Aires firm, Atanor, Compania Nacional para la Industria Quimica, S.A.M. This company produces 25 metric tons of phenol per day, and approximately 100 metric tons per month of monochlorobenzene for sale over and above internal needs.

In the Dominican Republic, inauguration of a new factory for processing rubber has been announced by the local radio, according to U. S. consulate officials there. This plant, at Monsenor Noel, is described as the first step in the Government's plan to reach a goal of 10 million pounds of rubber in the next five years. An appropriation of approximately $30,850 for planting rubber trees has also been reported.

From Brazil, comes word that the Petrobras synthetic rubber plant is expected to begin production either this month or next. This installation has a capacity of 40,000 tons a year of SBR rubber and latex.

And also in Brazil, Petroleo Brasileiro, S.A. (Petrobras), has been licensed by Houdry-Brazilian Co. to construct a 29,000 metric ton per year dehydrogenation unit near Rio de Janerio. The Houdry unit will be located at Petrobras' synthetic rubber complex now under construction at Duque de Caxias. It will have the capability to produce butadiene from normal butane or mixtures of butane and butenes. In addition to the dehydrogenation unit, Petros has licensed two large Houdri-forming units which are now under construction near Rio de Janeiro and Sao Paulo.

• **Expansion Along the Mediterranean.** Negotiations in Spain have started about the petrochemical side of a new petrochemical complex planned for Puertollano. Participants in the summit meeting include, according to recent reports, Royal Dutch/Shell, I.C.I., Montecatini, and Phillips.

Further to the east, Pirelli has announced the opening of a large, new tire plant in the Messina province of Sicily. The plant, 44th of the Pirelli Group in Italy, is described as being capable of absorbing a considerable percentage of the local labor force, and will help to contribute to the decentralization of Italy's industrial production. The country has long been hampered by the industrial gap that exists between northern and southern regions.

In Cassino, another city in Southern Italy, Houdry Process Corp., and Compagnia Internazionale Generale Industriale—Malatesta S.p.A. (CIGI) have formed an equally-owned company to make polyurethane foam, and foam products. The firm, Montecassino, S.p.A., represents the second European joint venture effected by Houdry in the past 10 months. Earlier, the Philadelphia firm and Chemische Werke Huels of Marl, West Germany, formed Katalysatorenwerke Houdry-Huels G.m.b.H., to manufacture and sell catalysts.

And in Sardinia, Italy, Sardinia Rumianca, S.p.A., a chemical manufacturer of Turin, and Pittsburgh Plate Glass International, S.A., have formed a jointly-owned firm, Chimica Sarda, S.p.A. The new organization will manufacture glycerine, trichlorethylene, per chlorethylene, and ethylene dichloride by processes developed by the chemical division of Pittsburgh Plate Glass.

• **Polyisobutylene Plant in South Wales.** The United Kingdom is shortly going to get its first polyisobutylene plant, to be built in Baglan Bay, S.W., by the overseas chemical division of W. R. Grace & Co.

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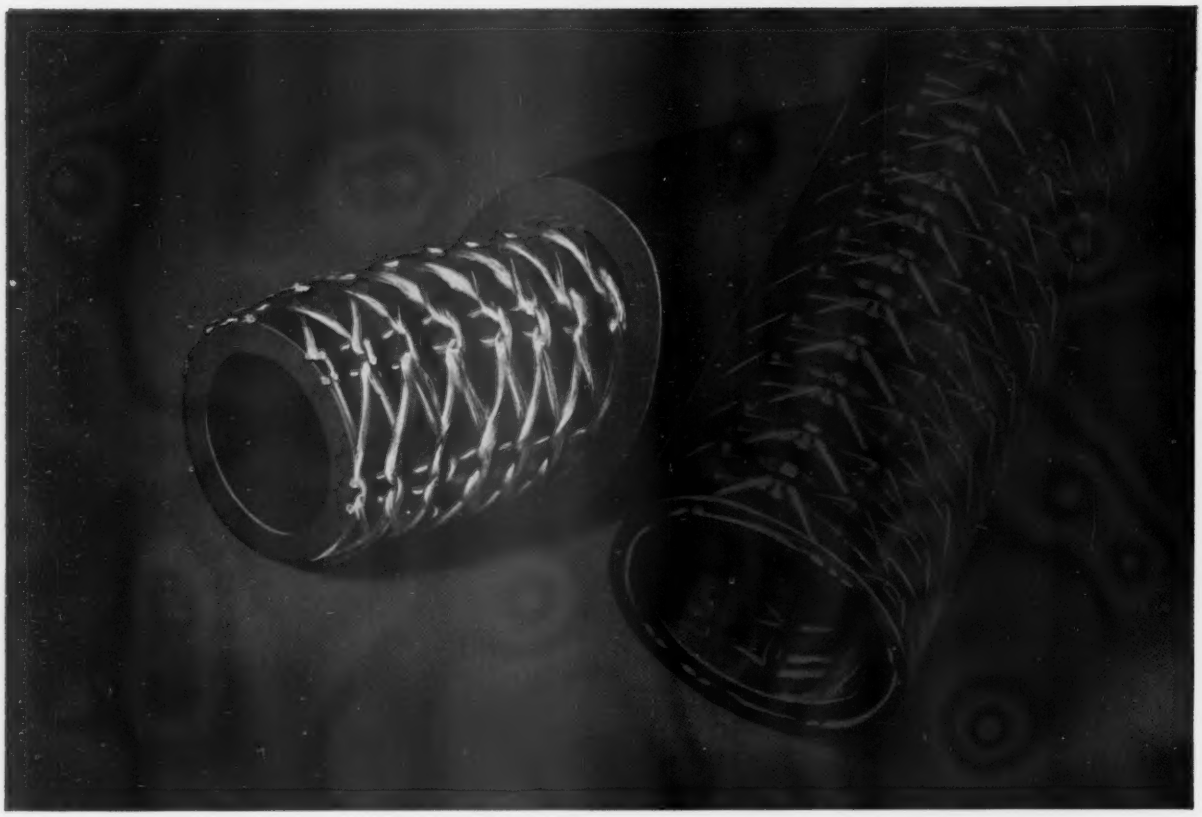

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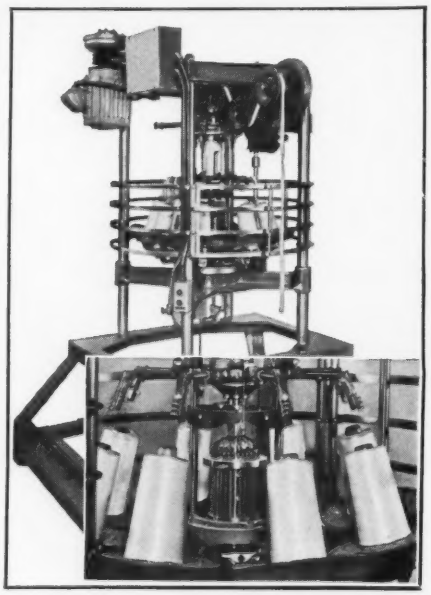

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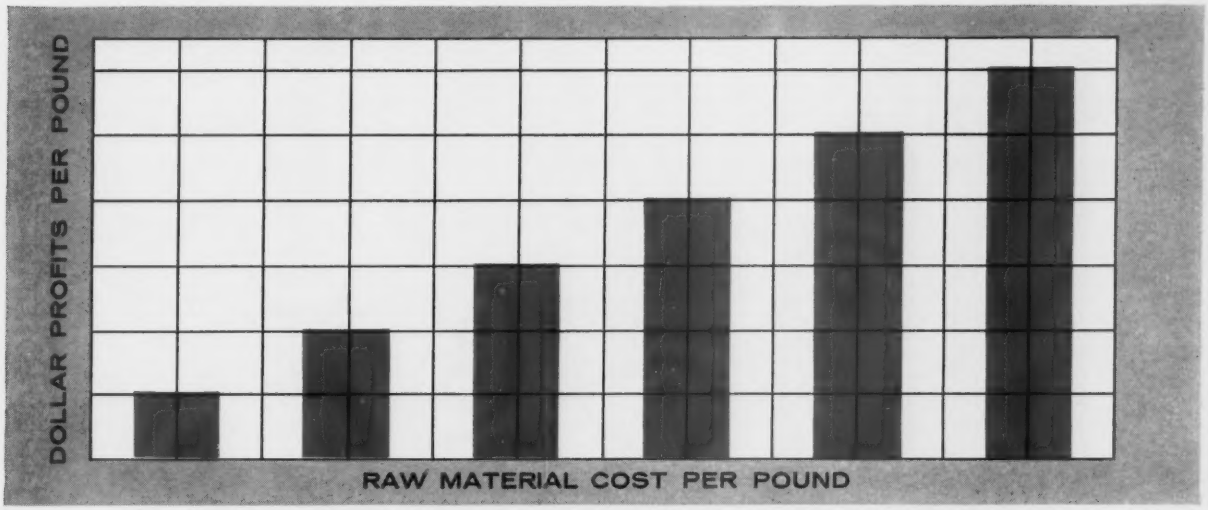

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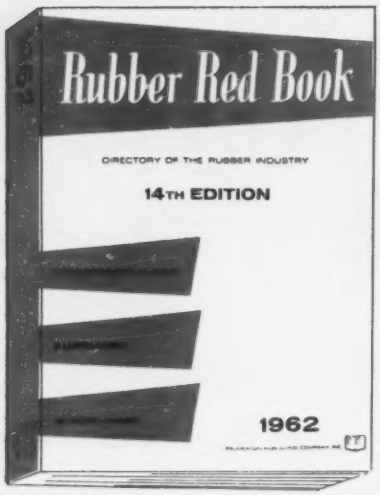

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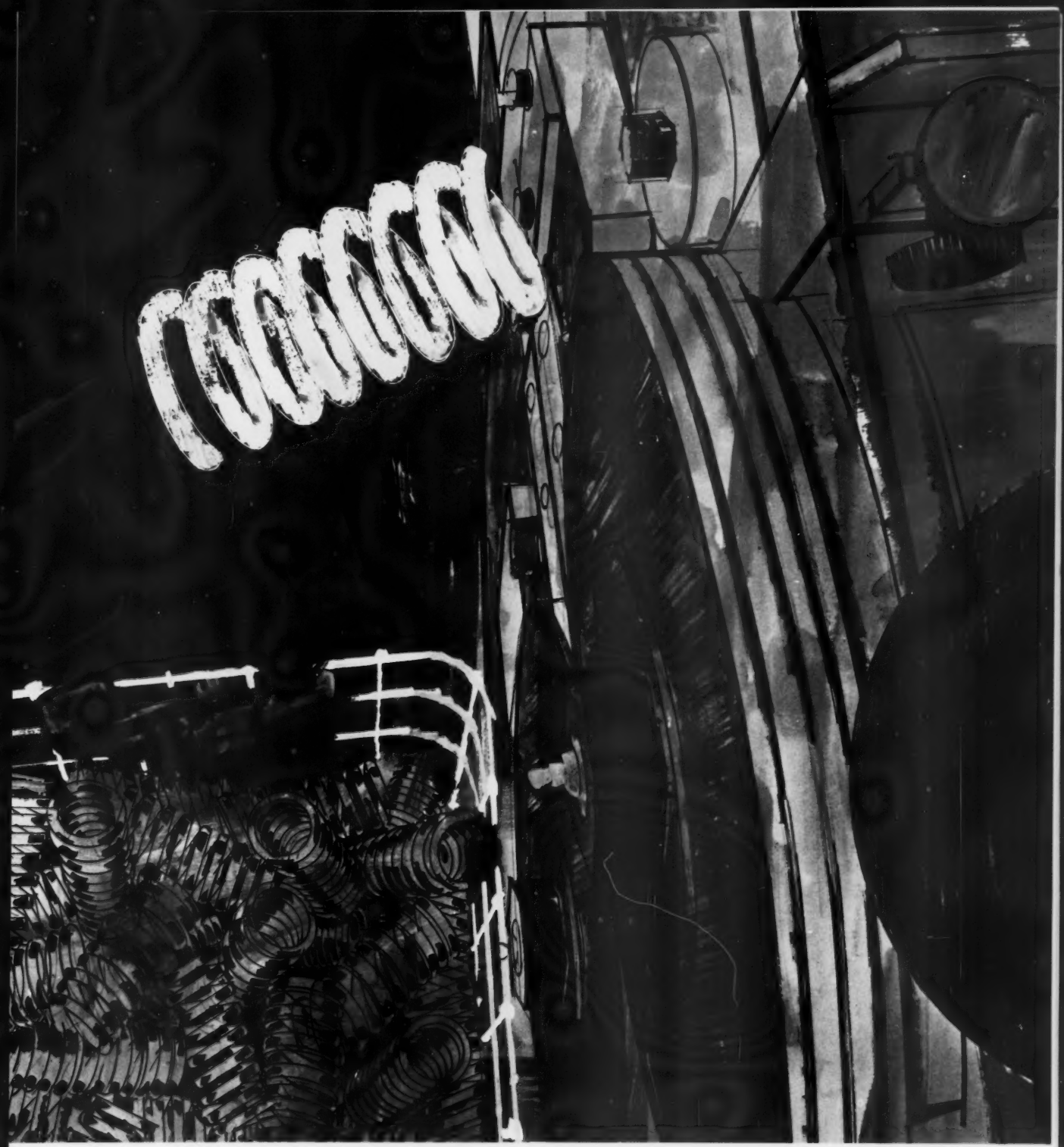

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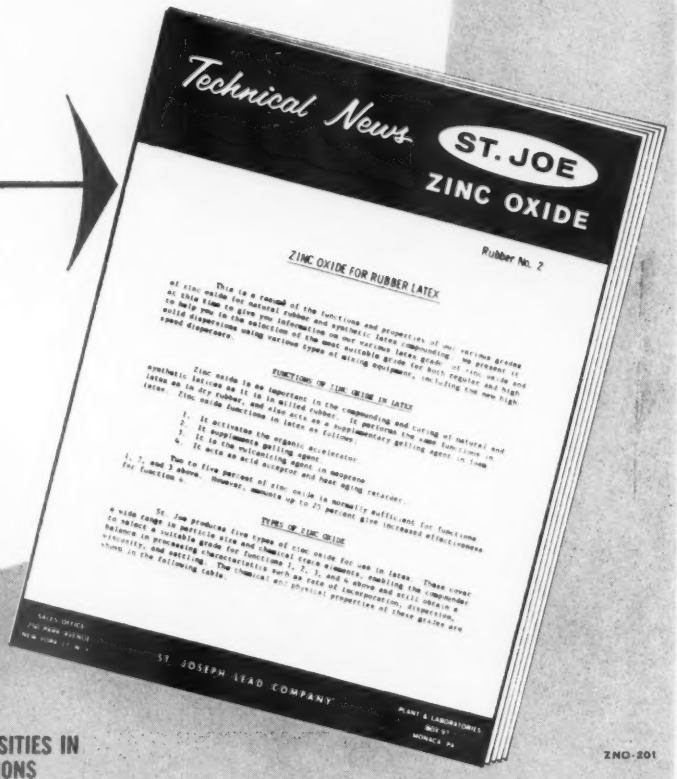

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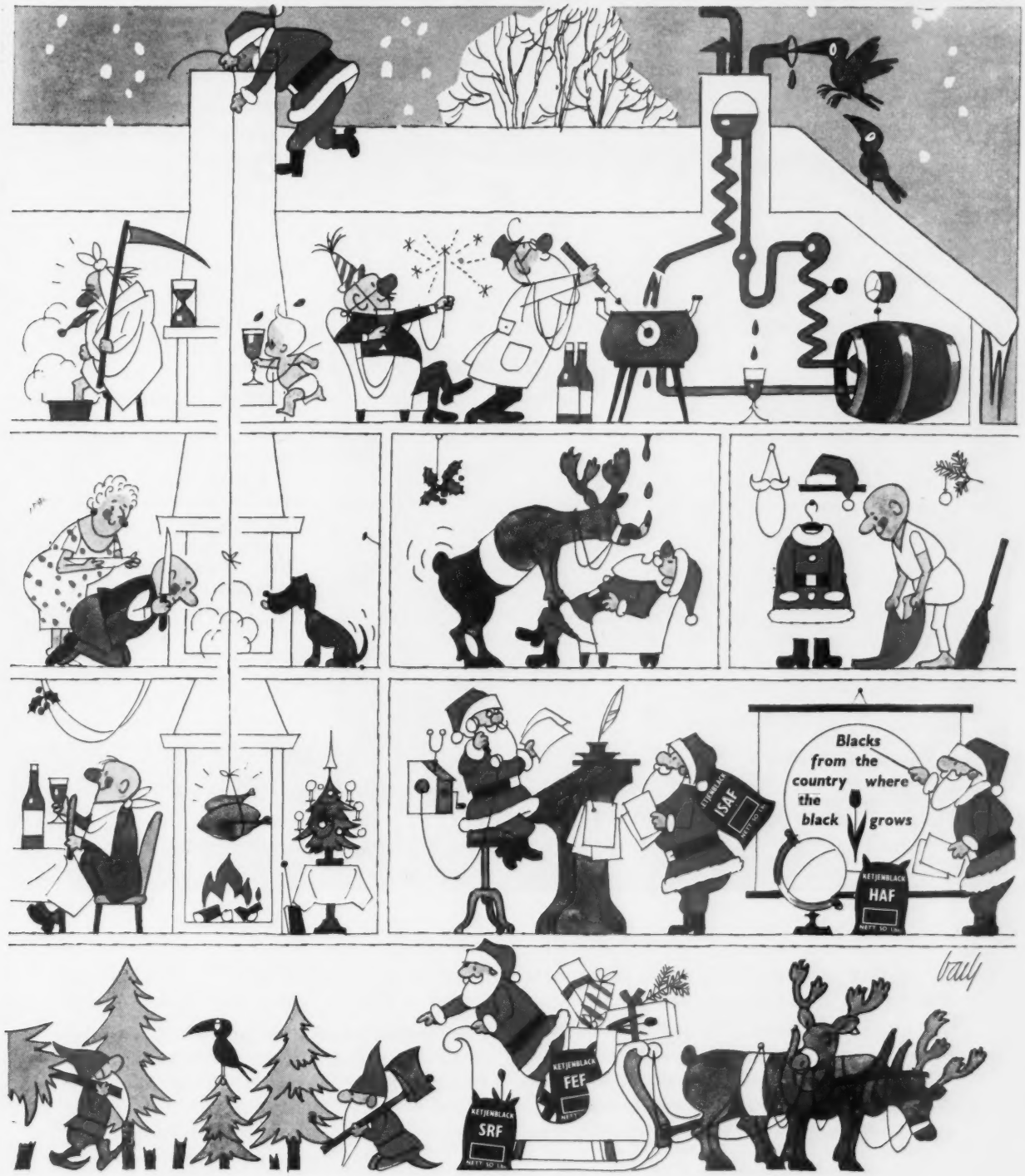

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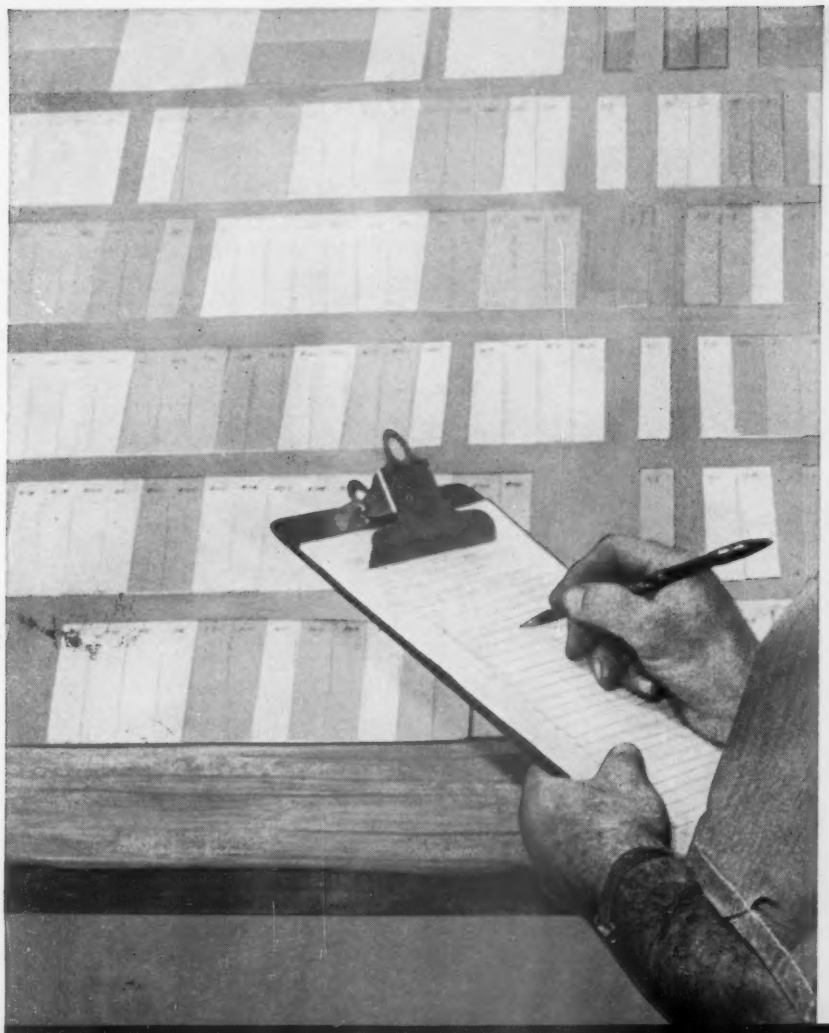

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As Ken Soule Sees It

by Kenneth J. Soule

More About Gas Masks

In our May, 1961, column we published an item entitled "Gas Masks, Everyone?". In reference to this item, we received a critical letter from a Dr. Frederick Bellinger of Atlanta, Ga., who expressed the opinion that we erred in our remarks. That is his privilege. He is entitled to his opinion as I am to mine. (Incidentally, the views I expressed are my own, and are not necessarily shared by the editor or publisher of RUBBER AGE.)

Here is the substance of Dr. Bellinger's criticism.

"(1) *Their (OCDM) contention, therefore, is that every man, woman, and child in our country should be provided with a suitable vinyl mask to protect against possible chemical, biological, and radiological attack.* Error: OCDM does not intend to provide 180,000,000 masks. It does hope that our population will provide itself with this mask protection.

"(2) *Just how such an enemy attack could cover even a minute portion of the land area of the U.S. is far from clear.* Error: The writer could not have made even a slight effort to obtain facts. Apparently he has not read the American Chemical Society's *Advances in Chemistry,* Series No. 26, nor the articles in the *New York Times, Harpers, Life, Time, U.S. News & World Report,* nor any of the unclassified releases by congressional committees.

"(3) . . . *we doubt that Congress . . . will waste much time in turning down this half billion dollar (180,000,000 masks @ $3.00) brain wave.* Error: Same lack of understanding as in paragraph 1.

"(4) *Unfortunately, the OCDM has apparently thrown away $500,000 on the project already . . .* Error: The $500,000 contract with the General Tire & Rubber Co. was for the development of a pilot production line from which manufacturing feasibility, costs, quality control procedures, etc., would be established. Such data are needed to attract industry to engage in production on a commercial basis and to permit large-scale production to be initiated and expanded at the proper time.

"I am not an 'alarmist' but the degree of protection afforded by the civilian mask at such low cost insures that I will buy masks for my family as soon as they become available through commercial outlets. And I'll hazard a guess that the writer would be among the first to go to a store and demand he be supplied a mask in the event that a war of any type seems imminent." This ends Dr. Bellinger's remarks.

Rebuttal

In answer to Dr. Bellinger: He states (1) "OCDM does not intend to provide 180,000,000 masks. It does hope that our population will provide itself with this mask protection."

The original *Chemical & Engineering News* article stated, "Since OCDM hopes to provide every man, woman, and child in the country with such a mask, the order would represent a large piece of vinyl business." Obviously, if any manufacturer is going to produce 180 million masks (or any sizable percentage thereof), a firm order must be forthcoming. This can only mean that the government will foot the bill. It is, therefore, the merest quibbling to say that "our population" will buy its own masks, and so there will be no government expenditure.

Regardless of Dr. Bellinger's statement (2), I have read the ACS pamphlet *Advances in Chemistry,* No. 26, as well as reams of articles, statements, pronouncements, etc., regarding civil defense, in a large number of publications. It can hardly be said that there is much agreement in even the best informed circles as to what (if anything) should be done about shelter to protect civilians against radioactive fallout. Since masks offer little or no protection against this hazard, the advisability of masks for everyone does not appear high on anyone's agenda. This is also true since atomic attacks are considered to be a much more likely enemy choice than poison gases (being more deadly and far easier to control).

Finally, a word about the proposed civilian vinyl masks (4). Even before April, 1960, the Army's Chemical Corps had developed such a mask, known as CDV-805. This is the identical mask for which the OCDM felt it was necessary in 1961 to spend $500,000 to "establish production techniques and costs", although thousands of the masks had already been produced by the Chemical Corps. It seems likely that quite a number of capable rubber or plastic fabricators would have been happy to bid on the production of a sizeable order for such masks, without the need for a half million dollar subsidy to anyone to find out how to make them.

If Dr. Bellinger, or anyone else, finds solace in the possession of a gas mask, I hope they obtain one promptly. However, each purchaser should ponder well the actual cost of the mask. Not the arbitrary piece price of $3.00, but the total half billion dollar charge which would automatically be added to our colossal national debt and thus become a lien against all citizens and their children after them.

As Ken Soule Sees It (cont'd)

Fresh Water While You Wait

Much has been accomplished—and a great deal more remains to be done—before a commercially practical method of producing fresh water from sea water is achieved.

In the meantime, in the do-it-yourself field, the U.S. Army has developed a pint-sized still which, it is claimed, will make "enough fresh water to keep a person who survives a sea disaster from dying of thirst." Energy to operate the device can come either from the sun, or from the body of a person *sitting* on the still.

As described in *Chemical & Engineering News* "Newsscripts," the "sit still" is made up of five sheets of dissimilar materials, each approximately 8½ by 11 inches, assembled in sandwich form. The top layer is a black plastic film, followed successively by a piece of light cloth or paper toweling, a water-repellent screen, a sheet of aluminum foil, and finally, on the bottom, a piece of cloth backing.

In use, the five-layered still is dipped into ocean water, the excess water drained off and the aluminum foil wiped dry. The device is then put back together and then exposed to the sun. If the day is cloudy, or overcast, or at night, the operator simply sits on the still. Heat, whether solar, or of body variety, passes through the layers as far as the aluminum foil, which is cooled by contact with the water-saturated cloth underneath it. This cooling condenses drops of fresh water on the foil, from whence it can be sponged up by the shipwreck victim. The amount of pure water so obtained would not be great, but it would be enough to keep a person alive.

The designer of the still, Dr. Clyde S. Barnhart, R&D Labs, Army Engineers, Fort Belvoir, Va., states that its efficiency can be increased considerably if more layers of toweling, screen, and foil are added. If this is done, it is possible to produce about a pint of potable water in 16 hours. In any case, Dr. Barnhart's invention bids fair to save a lot of lives among victims of ocean disasters, if this simple still should become standard life-saving equipment on various ocean-going craft. In a sense, it might be as effective a safety medium for boats as seat belts are in automobiles. Oddly enough, both devices work while you sit!

It's Your Move

According to someone's statistics, one out of every five American families moves each year. Whether or not this figure is accurate we do not know. It seems high; but when you observe all the feverish home building in the suburbs and think how the personnel in your own neighborhood has changed in a few short years, the estimate becomes credible.

In any case, for movers-to-be, or for those with merely an academic interest in new and novel gadgets, the Poly-Tite portable machine, designed for quickly and securely wrapping dishes and many other small items, may be intriguing. As described by Eleanor Adams in the *N.Y. Herald Tribune,* the device operates as follows: The mover brings the machine into your kitchen, plugs it into an electrical outlet, and starts working. A piece of plastic coated fibreboard (about 14 by 18 inches) is placed on a table, counter or bench. A number of plates (3 to 6) are turned upside down in the center of this cardboard—or "palette"—and cups or glasses similarly placed in each corner or other open space. The palette and contents are then put in the sealing machine and a frame holding a sheet of thin, transparent plastic film placed over it. Heat and vacuum are applied for 22 seconds, causing the film to be pulled down and sealed to the cardboard base, with each glassware item securely held in place, but completely visible.

The same general procedure can be applied to a wide variety of silverware and china, as well as such diverse material as boxes and cans of spices, condiments, etc., the varied contents of the average medicine cabinet, or a collection of costume jewelry. In fact, almost any relatively small, fragile, or readily mislaid items would be a natural for this sealed-in-plastic operation. Each palette can hold up to 40 pounds, and obviously the material which it carries is much more accessible, and safer from breakage or loss than when packed in shredded paper or newsprint, as is customarily done. Another advantage for the householder is that the palettes stack easily and can be kept unopened at the new home for an indefinite period, if desired.

Next time you move, maybe you, too, will get all wrapped up in plastic!

Double Duty Protective Clothing

According to *Industrial and Engineering Chemistry's* October, 1961, "Trendsletter," a new and quite unique clothing material will soon be available which will, at one and the same time, offer protection against flash fires and corrosive chemicals. The material in question is DuPont's Armalon which is made up of aluminized FEP-fluorocarbon film laminated to fabric of TFE-fluorocarbon fiber.

This multi-purpose product was originally developed for military use to protect operators making and handling missile fuels. The production of clothing, for use by workers who come into contact with such materials, is said to be in process. However, results already obtained in preliminary tests by government agencies indicate that Armalon is much more resistant to corrosive chemicals such as fluorine, chlorine trifluoride, and pentaborane than "any suitable fabric constructions yet evaluated."

As a consequence, it seems likely that industry will also find extensive uses for this specialized film-cloth laminate as it becomes more available, and as its unusual properties become more widely known. It can also be made without the aluminized coating, for use where fire protection is not a problem.

N-S Bead Wire...

The critical test of a tire bead is the split second it stretches over a rim. Bead wire must have high tensile strength, resistance to fatigue, freedom from imperfections, maximum uniformity, reliable finish. N-S Bead Wire conforms to these rigid standards, and you receive added value application engineering, multiple plant service, fast delivery.

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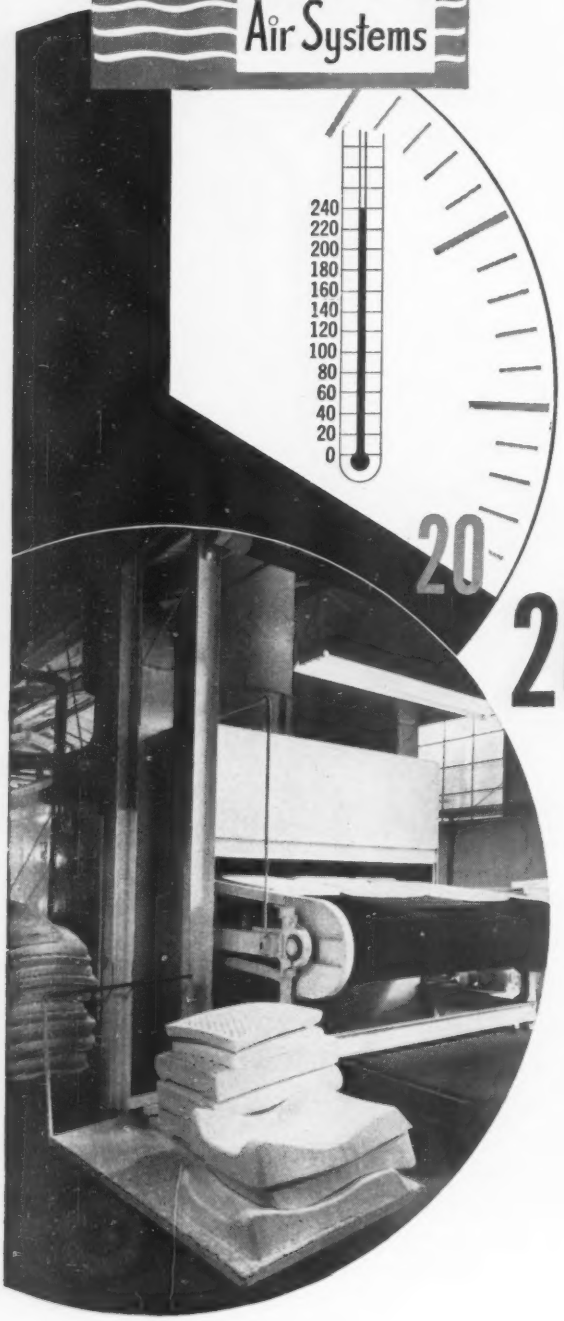

This refers to a foam rubber processing installation . . . a 65 foot long by 8 foot wide Ross Continuous Dryer and Curing Unit for drying C-Foam mattresses, furniture and aircraft cushions at the American Latex Corp. plant, Hawthorne, California.

Twenty minutes of the 45 minutes total continuous processing time are critically important because it is the curing period. Here is where the carefully conceived and controlled 'Engineered Atmosphere' comes into the picture. The temperature in this zone has to be held very close to 240°F by specially designed introduction, circulation and exhausting of hot air. Timing of travel has to be just right.

20 critical minutes at 240°F

Approaching the discharge end comes a complete reversal . . . a cooling zone, where residual hot spots, which could cause spontaneous combustion of the material in storage, are eliminated by the controlled introduction and circulation of cool air.

In this installation, there are at least four important elements of an 'Engineered Atmosphere' : zoning, circulation of hot air, temperature control and cooling . . . all precision problems. Drying, curing, baking, impingement, heating, cooling . . . these are typical of the operations on which Ross Engineers have concentrated their skills for more than forty years.

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PATENT REVIEW

by Melvin Nord

Vented Rubberized Fabric Article

U.S. Patent 2,973,799, issued March 7, 1961, to Arthur Kelly and assigned to the B. F. Goodrich Co., relates to the manufacture of articles formed by lamination of plies of rubberized fabric, such as tires, hoses, and belts. In accordance with this invention, there is virtually immediate release of the trapped air to the atmosphere by means of short lengths of textile fibers that extend entirely through the fabric with ends that project past the faces of the fabric. When such a fabric

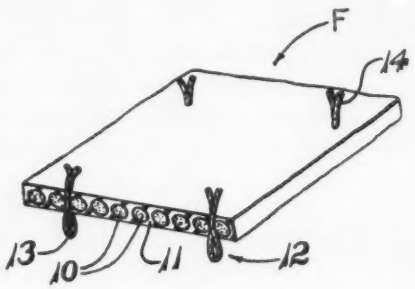

Figure 1

is formed into plies, as on a tire building drum, air trapped between the plies can pass directly through the rubberized fabric plies and find its way to the atmosphere. These wicking or bleeding textile fibers are formed of relatively short lengths of material like the usual bleeding yarn, which is a soft small diameter cotton yarn that readily wicks or conducts air.

An enlarged section of a piece of rubberized fabric (F) is shown in Figure 1. The fabric consists of a layer of elongated parallel cords (10) of cotton, rayon, nylon, wire or other tensile material. The cords are coated with rubber in a calender, the rubber having been previously masticated to place it in a plastic state. The coat of rubber (11) not only fills any spaces that may exist between the cords, but also provides a thin layer or skin of rubber that covers the cords.

The venting yarns (12) are in the form of short loops of cotton yarn about .010″ in diameter, the loops having a bight or looped end (13) on one side of the fabric sheet and free ends (14) on the other side of the sheet. The loops are applied so as to extend between the cords of the rubber material and the cords firmly grip the loops by friction, this being particularly true since the rubber material is somewhat tacky at this stage.

Figure 2 illustrates the stage in the building of a

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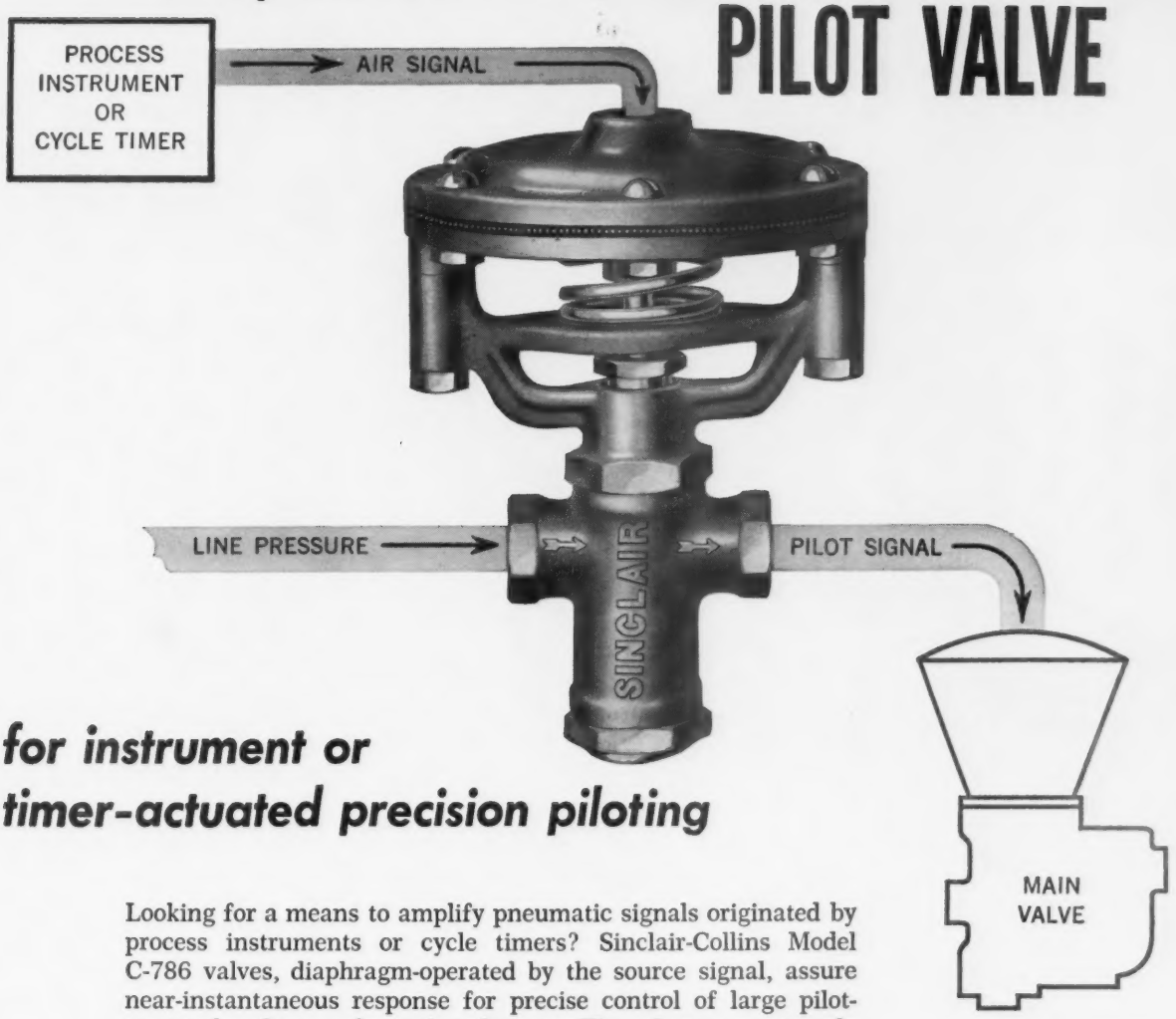

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PATENT REVIEW

pneumatic tire where various plies are laid upon a tire building drum (17). If the tire is a tubeless tire, the rubber liner (18) will be laid up on the drum and two or more inner plies (19) will be successively applied to the drum. The innermost fabric ply and liner may have been joined together

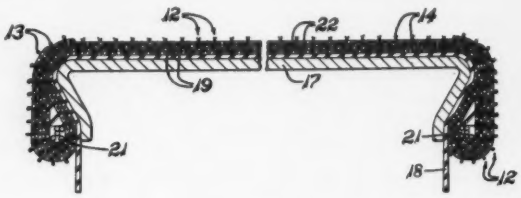

Figure 2

before application to the drum. After the inner plies are applied, the beads (21) are set. Outer fabric plies (22) are then successively applied and the ply ends are turned around the beads. As the various plies are successively laid up on the drum, air is usually trapped in spots and it is important that this trapped air be eliminated as the building operation proceeds to avoid danger of blisters and ply separation. This is done by stitching or rolling the plies together as they are applied to the drum. Since the venting yarns in the fabric of this invention lead directly from the inner face of the last applied ply directly to the atmosphere, elimination of trapped air between the faces of the plies as they are successively applied is assured, and there will be no appreciable amount of trapped air remaining in the green tire carcass at the stage shown in Figure 2. where it is ready for application of a sidewall and tread cover.

Safety Pneumatic Tire

U. S. Patent 2,969,824, issued January 31, 1961, to Frank A. Howard, provides a dual-tire, dual-valve construction embodying a deflation alarm which gives notice of loss of pressure in the outer tire.

A tubeless tire is used, with an inner tire or safety ring closed by a strip of rubber vulcanized at its inner portions to the safety ring. The safety ring is thus sealed in air-tight manner. It functions to carry the load in the event of deflation of the tire, and uses the beads of the tire as the anchorage which holds the safety ring firmly in place. A dual inflation valve is also provided. A metal fitting passes through the safety ring, and is connected by a molded rubber conduit to the valve. This dual valve arrangement holds air in the inner tire chamber if the outer chamber becomes deflated.

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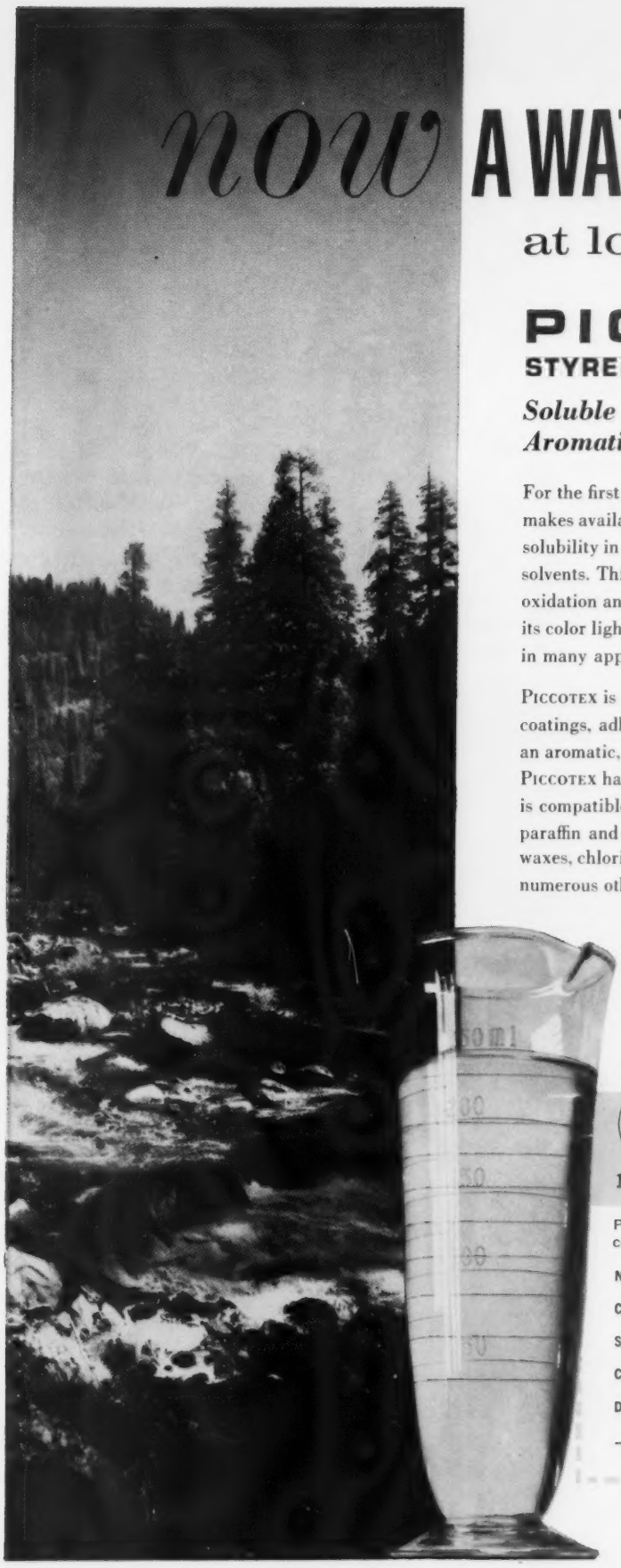
PATENT REVIEW

Tire Antiskid Device

U. S. Patent 2,961,026 issued November 22, 1960, to Willard J. Stanton, provides a tire skid patch for tires. The patch is capable of being attached to the top of the treads of the tire for a short period of operation. It contains an abrasive sheet, a layer of pressure-sensitive high peel strength adhesive on one side of the sheet, and a removable protective cover over the layer of adhesive.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Tire construction	U. S. Rubber Co.	2,968,331	1/7/61
Valve stem for tubeless tires	Dill Manufacturing Co.	2,968,333	1/7/61
Lacerating tire treads for traction	B. F. Goodrich Co.	2,968,344	1/7/61
Stable polyurethane latex	E. I. duPont deNemours & Co.	2,968,575	1/7/61
Rubber antioxidant	American Cyanamid Co.	2,968,630	1/7/61
Composite rubber-steel wheel tread	Stanray Corp.	2,969,254	1/24/61
Vulcanizable butyl rubber-GRS blends	Esso Research & Engineering Co.	2,969,341	1/24/61
Vulcanizing press	Cleveland Trust Co.	2,970,342	2/7/61
Tire curing bag	William T. Morris	2,970,344	2/7/61
Heating unit mount for a tire mold matrix	Super Mold Corp. of Calif.	2,970,346	2/7/61
Activator system for synthetic rubber polymerization	B. F. Goodrich Co.	2,970,975	2/7/61
Vulcanization of an air spring	Firestone Tire & Rubber Co.	2,971,220	2/14/61
Sidewall valve for tubeless tires	Dill Manufacturing Co.	2,971,526	2/14/61
Cross rib tire	Dayco Corp.	2,971,552	2/14/61
Tire construction	Firestone Tire & Rubber Co.	2,971,553	2/14/61
Pneumatic air springs	Firestone Tire & Rubber Co.	{2,971-559-62 {2,971-875	2/14/61 2/14/61
Applying tread to tires	William S. Cahill	2,971,563	2/14/61
Tire bands applying device	Yokohama Rubber Co., Ltd.	2,971,564	2/14/61



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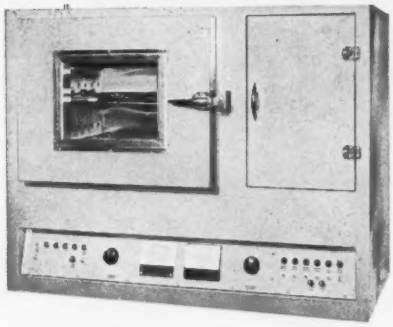

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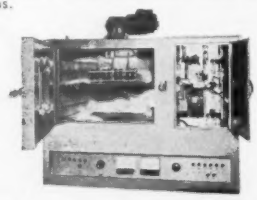

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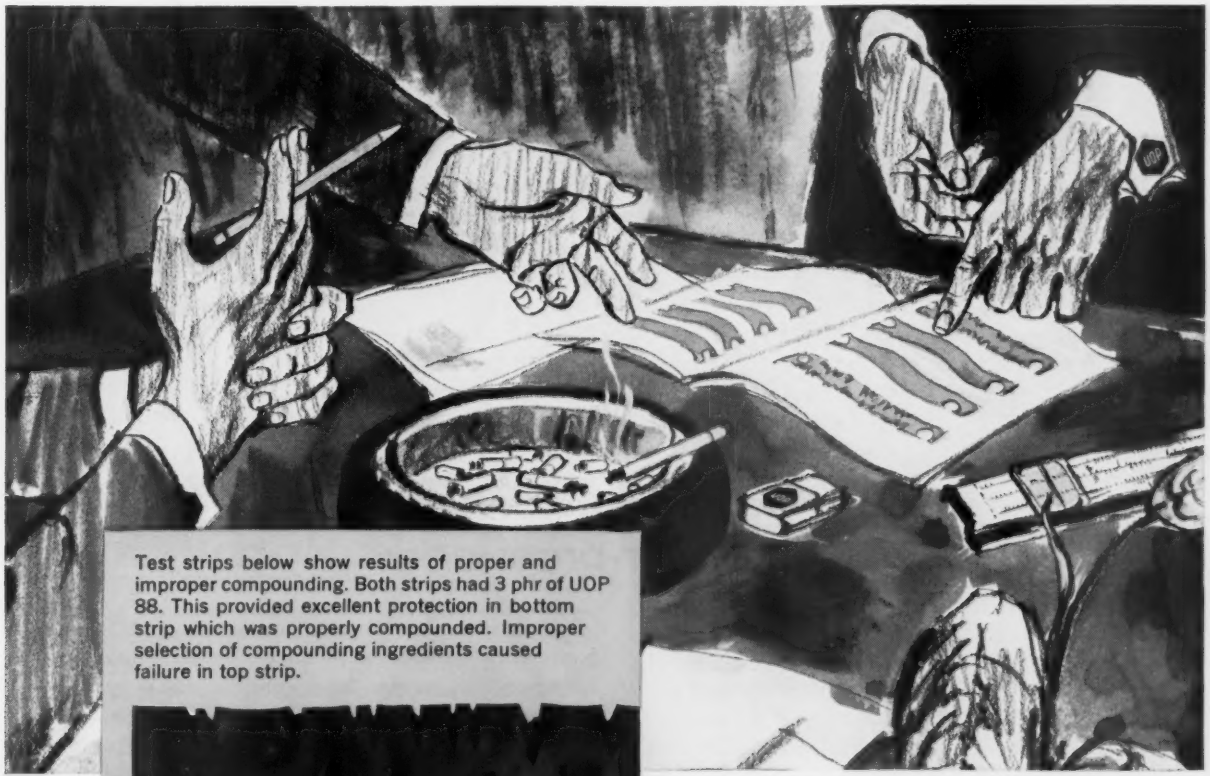
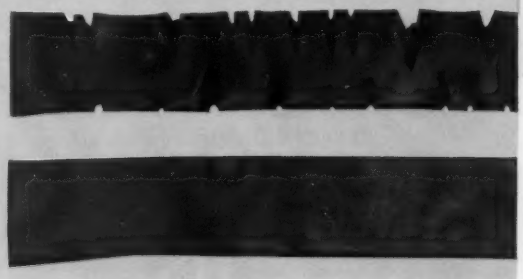


Test strips below show results of proper and improper compounding. Both strips had 3 phr of UOP 88. This provided excellent protection in bottom strip which was properly compounded. Improper selection of compounding ingredients caused failure in top strip.



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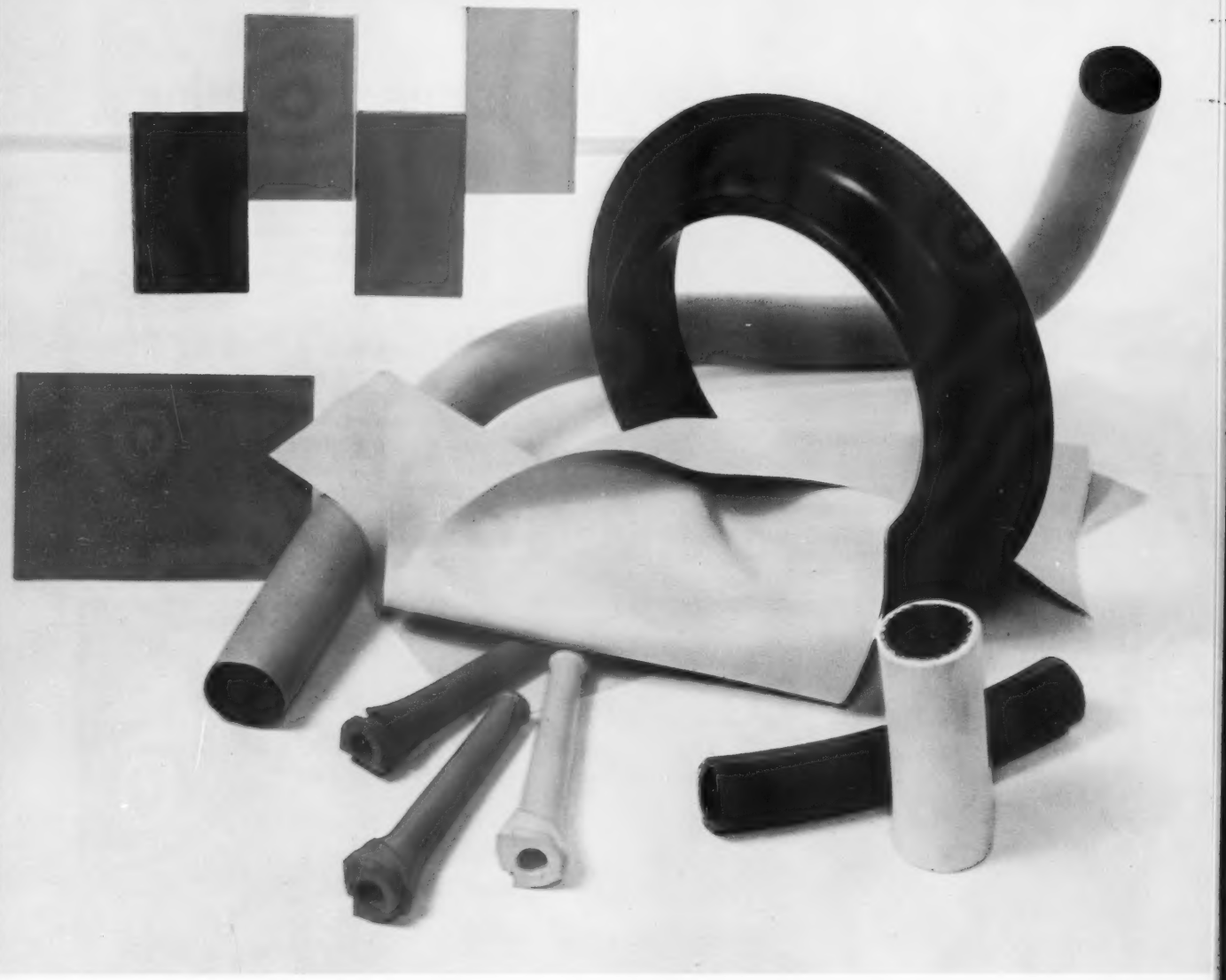

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RUBBER AGE/VOL. 90, No. 3/December, 1961

Compounding, Mixing and Blending 98% *cis* Content Polybutadiene Rubber

An introduction to factory processing of a new stereospecific rubber, alone or in blends, and a study of effects of commonly used blacks

By D. V. SARBACH and A. T. STURROCK
Goodrich-Gulf Chemicals, Inc.
Cleveland, Ohio

THE development of any new rubber must be accompanied by the development of the whole new compounding and use technology. When *cis*-polybutadiene became available as a logical outgrowth of Goodrich-Gulf's discovery of a stereospecific catalyst for polymerization of rubber-like materials in 1954, it became necessary to develop compounding procedures to handle it. Because of its peculiar properties, including the ability to impart its improved wear resistance to mixtures with natural rubber, the initial efforts to use *cis*-polybutadiene were those which provided for its mixing with natural rubber. However, with a structural regularity, or *cis* content, as high as 98 per cent, this polybutadiene rubber—Ameripol CB—can be used as the only rubber hydrocarbon in tread stock and similar compounds.

Extensive testing and development work in the processing of this rubber has been carried out both in laboratories and users' plants. These research programs indicate that the new polymer can be processed readily in virtually all existing plants, with minimum modification to existing equipment or procedures. The following steps outline compounding, mixing and blending procedures for Goodrich-Gulf's *cis*-polybutadiene rubber, Ameripol CB, alone and in blends, and includes a study of the effect on physical properties obtained by varying both the type and the amount of those carbon blacks commonly used in SBR and natural rubber compounding.

100 Per Cent Hydrocarbon

During the testing and sampling program conducted by Goodrich-Gulf, processors have shown particular interest in compounds using Ameripol CB as the only rubber hydrocarbon in a formulation. When used in tread stocks, specific formulations of this kind have given tread wear indices of 165 or higher in extensive road tests, particularly under severe wear conditions. Groove cracking also was substantially reduced; resistance to groove cracking, a property which Ameripol CB possesses by itself, is one which it is also able to impart to blends with other rubbers.

In blends with natural rubber or *cis*-polyisoprene, Ameripol CB can be used in concentrations of from 10 to 90 per cent without requiring major mixing or processing modifications. Three-way blends of Ameripol CB, natural rubber and SBR in widely varying ratios also have been used with considerable success. Blends with SBR or oil-extended SBR also have been

used successfully; however, blends of Ameripol CB with natural rubber are slightly smoother. Blends of Ameripol CB with ordinary reclaims have been made and processed satisfactorily, but such blends do not show the same improvement in physical properties found in other blends.

Ameripol CB by itself is an extremely tough rubber. It has essentially no cold flow and does not respond to the usual mastication and accompanying oxidative breakdown which is characteristic of many other rubbers. To overcome this characteristic, Goodrich-Gulf has developed and perfected a treatment called "preprocessing." This consists of adding a synergistic combination of processing aids during the production of the polymer. This treatment enables Ameripol CB to be used as the only rubber hydrocarbon in a given formulation. It also greatly improves blending with other rubbers, and improves pigment or filler dispersion, resulting in better physical properties of the final compound, including higher abrasion resistance.

Ameripol CB designated in the Type 800 series has 14 parts of processing aids added to each 100 parts of polybutadiene hydrocarbon. Therefore, in recipes using this type the amount of rubber is written as 114 parts. Since, in the test and development program, the 800 series has proved the most versatile, alone or in blends, it is the type referred to in this article.

Types 300 to 700, with lower additions of processing aids, have been used for special applications. The pure gum, or non-preprocessed CB polybutadiene, is designated as the Type 200 series. The pure gum Ameripol CB has a Mooney viscosity (large rotor, 4 min. @ 212° F.) of 45 to 55, whereas, Type 888-A preprocessed polymer has a Mooney viscosity of from 27 to 33.

Mixing Ameripol CB

Blends of Ameripol CB with natural rubber and/or SBR present no particular mixing problems. Compounds based on 100 per cent Ameripol CB can be mixed either on rubber mixing mills or in internal mixers such as the Banbury, the Shaw Intermix or the Warner-Pfleiderer types of equipment. Banbury and other internal mixing of 100 per cent Ameripol CB compounds is, of course, much faster than mill mixing and pigment dispersion is usually better.

Simple mixing instructions are given here for guidance. However, minor modifications may have to be made in view of equipment variables existing between different plants and laboratories.

Banbury mixing procedure for 100 per cent preprocessed Ameripol CB compounds: (Except for roll spacing, these procedures apply to both laboratory and plant-size equipment). Be sure batch weights are calculated so mixing chamber will be full after all ingredients are added.

Masterbatch

Start mix at 150°F. in a clean Banbury mixer.	
Add all the preprocessed Ameripol CB	0 min. (cooling water on full)
Add all other ingredients except sulfur and accelerator	1 min.
Dump	4 to 5 min.

Sheet-out mill rolls should be cool (100° F. or lower) and set .236 inch (6 mm.) apart. Allow all stock to pass completely through rolls to remove heat before banding. Cut and blend two to four minutes, then sheet off and cool. Allow this stock to age overnight (6 to 16 hours) or longer before proceeding with the next step. This aging period is very important since it allows time for the mix to change from a relative dry, non-tacky composition to one resembling natural rubber in handling characteristics.

Final Mix

Start mix at 150°F. in a clean Banbury mixer.	
Add masterbatch	0 min. (cooling water on full)
Add accelerator	2 min.
Dump	3 min.

Sheet-out mill rolls should be cool (100° F. or lower) and set .236 inch (6 mm.) apart. Allow all of stock to pass completely through rolls to remove heat before banding. Add sulfur on sheet-out mill either as a dry powder or in masterbatch form, then cut and blend thoroughly to insure good dispersion. Batch out and cool. Age at least 3 hours, preferably longer before calendering or extruding.

As an alternative to the above procedure, the sulfur may be added to the Banbury mix about ½ minute before the batch is dumped to the sheet-out mill. One should keep in mind, however, that nearly all rubber compounds will scorch if left in a mixer too long with both sulfur and accelerator present. Ameripol CB is no exception although it is relatively less scorchy than natural rubber.

Most 100 per cent Ameripol CB compounds can be handled easily on overhead mixers or overhead blenders provided the rollers are slowed to the point where they do not apply undue tension on the rubber sheet. As the stock becomes cooler, its toughness and ease of handling will improve.

Banbury mixing procedure for blends of preprocessed Ameripol CB and natural rubber: If the natural rubber has been plasticated or presoftened, both rubbers may be added to the Banbury mixer at the same time. If a tough rubber such as crude ribbed smoked sheets is used, then the following mixing procedure is recommended:

Start mix at 175°F. to 200°F. in a clean Banbury mixer.	
Add natural rubber	0 min. (cooling water on full)
Add Ameripol CB	1 min.
Add all other ingredients except sulfur and accelerator	2 min.
Add accelerator	3 min.
Dump	4 to 5 min.

Sheet-out mill rolls should be at 120° F. to 130° F. and set .236 to .43 inch (6 to 11 mm.) apart. Allow all stock to pass completely through rolls to remove heat before banding. Sulfur may be added as a powder or in masterbatch form on the sheet-out mills or, if preferred, directly to the Banbury mixer about ½ minute before dumping. Cut and blend well on sheet-out rolls to insure good dispersion.

Final compound should be aged overnight before calendering or extruding.

Mill-mixing procedure for 100 percent preprocessed Ameripol CB compounds: These procedures are designed specifically for 6 inch by 12 inch standard laboratory mixing mills, however, except for roll spacing and batch sizes they will apply in general to factory-size mixing mills.

Mill opening	.040 to .050 inch
Roll temperature	100°F. or lower
Polymer weight	300 to 400 grams
Final batch	600 to 800 grams

First Stage

(1) Band the Ameripol CB on the front roll and cut and blend at least eight times each way. Total time, 2 to 4 minutes.
(2) Add zinc oxide and antioxidants. Cut and blend four times each way.
(3) Add ⅓ of black or fillers along with fatty acids and oils (if any) over a 6 to 10 minute period with cooling water on to keep roll temperature below 140° F. if possible.
(4) Open mill to .060 to .070 inch and add remainder of black or fillers, 15 to 25 minutes. Cut and blend well.

Sheet off stock and allow to age overnight or longer. This aging period is very important. (See under Banbury Mixing.)

Second Stage

Mill opening .070 to .080 inch. Roll temperature 100° F. or lower. Keep water on full.

(1) Band first stage masterbatch and cut and blend 2 minutes.
(2) Add accelerators over a 2 to 3 minute period. Cut and blend four times each way.
(3) Add sulfur over a 2 to 3 minute period. When all free sulfur has worked in, cut and blend eight times each way.
(4) Cut stock from rolls, set mill opening .015 to .020 inch, then roll and pass stock endwise through rolls at least six times. Sheet out and age overnight, then remill 5 minutes before preparing test specimens.

Mill-mixing procedure for blends of preprocessed Ameripol CB and natural rubber

First Stage

Roll temperature 125° F. to 140° F. Polymer weight (combined) 300 to 400 grams. Final batch 600 to 800 grams.

(1) Set mill rolls tight and masticate the natural rubber 2 to 4 minutes until it is smooth and soft.
(2) Sheet off the rubber and set aside, then sheet out the Ameripol CB in one or two passes and set aside. Set mill opening .030 to .040 inch, band the masticated natural rubber, then add the sheeted-out Ameripol CB a little at a time for about 2 to 3 minutes. Turn cooling water on full. Cut and blend well.
(3) Add zinc oxide and antioxidants over a 2 to 3 minute period. Cut and blend four times each way.
(4) Add ⅓ of black or fillers along with fatty acids and oils (if any) over a 6 to 10 minute period. Cut and blend well.
(5) Open rolls to .070 to .080 inch, and add remainder of black or fillers for 15 to 20 minutes. Cut and blend well. Sheet off stock and allow to age overnight or longer.

Second Stage

Mill opening .070 to .080 inch. Roll temperature 100° F.

(1) Band masterbatch and cut and blend 1 to 2 minutes.
(2) Add accelerator over a 2 to 3 minute period. Cut and blend four times each way.
(3) Add sulfur over a 2 to 3 minute period. When all free sulfur has worked in, cut and blend eight times each way.
(4) Cut stock from rolls, set mill opening .015 to .020 inch, and roll and pass stock endwise through rolls at least six times. Sheet out and age overnight, then remill 5 minutes before preparing test specimens.

Fabricating Ameripol CB Compounds

Ameripol CB, alone or in blends with other rubbers, lends itself to the customary techniques of calendering, extruding, etc.

Calendering: Most 100 per cent Ameripol CB compounds will calender much like corresponding SBR compounds except that the former are smoother, denser and softer.

In blends with natural rubber and/or SBR, as little as 20 per cent preprocessed Ameripol CB will make for higher calender speed at a lower temperature, and in coating or frictioning operations, will promote better fabric penetration. Presence of preprocessed Ameripol CB in such operations also tends to produce a smoother sheet with increased tackiness.

Extruding: Compounds based on 100 per cent Ameripol CB have been extruded easily through machines ranging from the smallest laboratory sizes to 10-inch production type extruders. Most satisfactory conditions are cool barrel and screw (approximately 100° F.) and a hot die (225° F. to 250° F.). Extrusions will be extremely smooth with a minimum of gauge variation and porosity.

For a typical tread-type compound, 100 per cent Ameripol CB will show approximately 10 per cent

greater die swell than a similar natural rubber compound; slightly less than 10 per cent greater when compared to a similar SBR tread stock. Extrusion rates between Ameripol CB and the more commonly used rubbers vary only slightly.

Bonding to Other Rubbers: When it becomes necessary to bond a 100 per cent Ameripol CB compound to SBR or natural rubber, as for example, applying an Ameripol CB tread to a standard carcass, a natural rubber cement or tie gum is recommended. Splicing Ameripol CB to itself requires only that the two adjacent surfaces be swabbed with clean gasoline and buffed with a stiff, wire brush. Cements are not recommended.

Compounding Ameripol CB

Plasticizers, Softeners, Oils: Preprocessed Ameripol CB normally will require no added plasticizers for high quality compounds such as tire treads. If the composition is to be extended or if a softer compound is desired, paraffinic or naphthenic oils are recommended for 100 per cent Ameripol CB formulations. In blends where some other rubber predominates, plasticizers or oils commonly used for the other rubber will normally suffice.

In relatively low concentrations (3 to 7 phr) various oils have little effect on the processing characteristics of 100 per cent Ameripol CB compounds although the advantage tends toward the paraffinic and naphthenic types. This advantage is most evident in smoothness, tackiness and rate of extrusion.

Physical properties of low-oil, 100 per cent Ameripol CB compounds also are affected only slightly by the type of oil selected. The one exception in this generalization is heat rise as measured on the Goodrich Flexometer at 212° F. under a 55 lb. load, 17½% stroke. In a typical, 100 per cent Ameripol CB tread compound containing 60 parts of HAF, five parts each of various oils were added to study their effect on physical properties of the vulcanizate. The differences in hysteresis reflected in the use of various types of oils is significant:

Type of Oil	ΔT (Heat rise above 212°F.)
Paraffinic oil	55°F.
Naphthenic oil	58°F.
Aromatic oil	63°F.
Highly aromatic oil	64°F.
Dioctyl phthalate	67°F.

Activation Fatty Acid: Preprocessed Ameripol CB is acidic as supplied and additional fatty acid normally is not required for vulcanization, however, any of the common, rubber grade, fatty acids will suffice if needed.

Activation Zinc Oxide: For curing with accelerators requiring zinc oxide, from 3 to 5 parts is sufficient. French process zinc oxide imparts slightly more smoothing effect to stock surface, but any rubber grade zinc oxide will suffice for vulcanization requirements for most compositions.

Accelerators: Acidic type accelerators such as the thiazoles are not recommended for Ameripol CB compounds. The basic (alkaline) types have proved very successful. Specific accelerators which have been used to advantage in 100 per cent Ameripol CB tire treads in concentrations ranging from 1.25 to 1.75 phr are:

N-Cyclohexyl-2-benzothiazole sulfenamide
Ex. Santocure, Furbac, Vulcafor HBS, Vulkacit CZ, Cydac, Delac S
N-Oxydiethylene-2-benzothiazole sulfenamide
Ex. NOBS Special, Amax, Santocure MOR, NOBS No. 1 (Contains 10% MBTS)
N-N-Diisopropylbenzothiazole-2-sulfenamide
Ex. DIBS

Such sulfenamide type accelerators may be activated with 0.10 to 0.30 phr diphenyl guanidine, diortho tolyl guanidine or tetramethyl thiuram disulfide, etc., if faster cures are desired.

Vulcanizing Agents: Ameripol CB may be vulcanized with any of the vulcanizing agents normally used with other rubbers; however, development work to date shows a preference for sulfur in concentrations of 1.25 to 2.00 phr for 100 per cent Ameripol CB tire treads.

In blends with natural rubber, sulfur will normally be increased as accelerator is decreased to achieve equivalent rates of cure.

Antioxidants: Ameripol CB contains approximately 1.25 phr of 2,6-ditertiary butyl paracresol as manufactured. However, additional antioxidant is usually added for specific end-product protection depending on service requirements. Specific effects of various antioxidants will be the subject of a later technical data report. Those found most effective to date include:

N-Isopropyl-N′-phenyl-*p*-phenylene diamine
Ex. Flexzone 3C, Santoflex 36, Bayer 4010NA
N,N′-bis (1-ethyl-3-methyl pentyl N)-*p*-phenylene diamine
Ex. UOP 88
6-Ethoxy-1,2-dihydro-2,2,4-trimethylquinoline
Ex. Santoflex AW
Polymerized 1,2-dihydro-2,2,4-trimethylquinoline
Ex. AgeRite Resin D, Flectol H
Diphenyl-*p*-phenylene diamine
Ex. AgeRite DPPD
A complex diarylamine-ketone reaction product 65% and commercial N,N′-diphenyl-p-phenylene diamine 35%
Ex. Flexamine G
Mixture of alkylated arylphosphites
Ex. Polygard

Reinforcing Pigments: For 60 Durometer, 100 per cent Ameripol CB tire treads, 55 to 60 phr of ISAF or HAF have been used successfully. Lower black concentrations can be used in tread-type compounds based on blends of Ameripol CB with natural rubber and/or SBR.

The following section illustrates typical effects of varying type and amount of carbon black in 100 per cent Ameripol CB compounds.

Mineral pigments behave in Ameripol CB in much the same manner as in SBR. Their specific effects will be the subject of a future technical report.

Carbon Black Evaluations In Ameripol CB

THE initial carbon black compounding studies on Ameripol CB have made use of readily available furnace blacks which were designed and developed primarily for SBR applications. These blacks have served quite well in polybutadiene rubbers, but product testing as well as laboratory evaluations indicate that the full potential of the stereospecific rubbers might well be revealed in the future through the use of special blacks which are unknown today.

The data presented in this report illustrate the effects of five, large volume furnace blacks in varying concentrations in Ameripol CB.

Method

The Ameripol CB used in this carbon black evaluation is Type 888A, one of the preprocessed varieties. The preprocessing treatment renders the polymer rubber-like and easy to use in 100 per cent polybutadiene formulations (no other rubber present) and assists in fast and thorough carbon black dispersion.

During the preprocessing operation for Type 888A, a total of 14 parts of processing aids were added under closely controlled conditions during manufacture of the Ameripol CB polymer, hence the figure of 114 for 100 parts of polybutadiene hydrocarbon.

In this study, four of the large-volume carbon blacks were evaluated in five different concentrations for each black in the following base recipe:

	Parts by Weight
Ameripol CB, Type 888A	114.00
Zinc oxide	5.00
N-Isopropyl-N′-phenyl-*p*-phenylenediamine	1.00
N-Cyclohexyl-2-benzothiazole sulfenamide	1.25
Sulfur	2.00
Carbon black	As indicated

The 2.00 parts sulfur and 1.25 parts accelerator are considered adequate for this study but it is not necessarily the optimum ratio for each black in its several concentrations. No sulfur-accelerators adjustments were made throughout the study and no plasticizers were added since such adjustments would modify the physical properties imparted by the blacks alone.

Mixing procedures followed recommendations set forth earlier in this article for Banbury mixing of 100

TABLE I—TEST PROCEDURES USED IN CARBON BLACK COMPOUNDING STUDY

Procedure	Test
Tensile Strength ... Modulus Elongation	ASTM-D-412-51T Die C @ Room Temp. 73.4 ± 2°F. Sample Preparation per ASTM D-15-59T
Hardness	ASTM D-676-59T Shore A Durometer @ Room Temp. 76 ± 6°F. 3 thicknesses of tensile sheet Procedures 5-A-immediate reading
Accelerated Aging .. (tensile, modulus of elongation & hardness)	ASTM-D-865-57 Sample Prep: Method D-412-51T Method D-15-59T Tension Testing: Method D-412-51T Hardness Testing: Method D-676-59T
Tear Resistance, with Grain	ASTM D-624-54 Die C - Room Temp. 73.4 ± 2°F.
Goodyear Healy Rebound	ASTM D-1054-55 Sample Prep: ASTM D-15-59T Test @ R.T. 73.4 ± 2°F.
Compression Set ...	ASTM D-395-55 Method B - 22 hrs. @ 158°F. Constant Reflection - 25% to 30% as applicable to hardness.
Dematti Flex-Crack Resistance	ASTM D-813-59 (M) cycles to produce .50" crack Test @ R.T. - 73.4 ± 2°F.
Compression Fatigue of Vulcanized Rubber ..... (Hysteresis)	ASTM D-623-58 Method A - Goodrich Flexometer (Start at 212°F., run 30 min. 55 lb. constant load, 17½% stroke, 30 cycle)
Mooney Viscosity ..	ASTM D-1646-59T ML 4 @ 212°F. (2 hrs. aging) 1 min. warm-up—Speed - 2 RPM'S
Mooney Scorch	ASTM D-1646-59T MS @ 280°F. (T-3 and T-18) Speed - 2 RPM'S
Pico Abrasion Resistance	See "Pico Laboratory Abrasion Test," *Rubber Chem. Tech.*, Vol. 34, No. 1, p. 1., Jan.-March, 1961

TABLE II—A COMPARISON OF VARIOUS FURNACE BLACKS IN 100 PER CENT AMERIPOL CB FORMULATIONS

	ISAF Carbon Black					HAF Carbon Black					FEF Carbon Black					SRF Carbon Black				
TYPE BLACK	ISAF	ISAF	ISAF	ISAF	ISAF	HAF	HAF	HAF	HAF	HAF	FEF	FEF	FEF	FEF	FEF	SRF	SRF	SRF	SRF	SRF
PARTS/100 RHC	40	45	50	55	60	40	45	50	55	60	40	45	50	55	60	60	70	80	90	100
UNAGED PHYSICAL PROPERTIES																				
MOONEY SCORCH (MS@280°F.)																				
T-3	8.6	8.5	8.3	8.0	7.4	9.1	8.5	8.2	8.4	8.6	10.5	10.0	9.3	9.1	9.1	11.2	10.9	10.4	10.0	8.4
T-18	10.0	10.0	10.0	9.5	9.0	11.0	11.0	10.0	11.5	11.0	12.2	12.0	11.1	11.0	11.0	12.8	12.5	12.2	11.5	10.2
CMP. MV (ML4@212°F.) CURED @284°F.	44.0	49.0	54.5	57.5	63.5	40	42	48	50	58	39.5	42.3	46.5	49.4	52.5	40.5	44.0	50.0	55.0	60.5
TENSILE STRENGTH (PSI) UNAGED																				
15 Min.	2000	2150	2300	2500	2450	1950	2000	2350	2400	2300	1800	1850	2200	2000	2050	1800	1800	1850	2000	1900
30 Min.	2000	2100	2650	2700	2400	2100	2300	2700	2400	2450	1800	1950	2150	2100	2150	1550	1800	1900	2100	2050
45 Min.	1950	2000	2450	2400	2350	2000	2450	2450	2500	2500	1650	1700	2000	1950	2100	1500	1700	1950	1950	1900
60 Min.	1950	2050	2350	2400	2500	1750	2200	2300	2350	2350	1600	1800	1950	2000	2150	1500	1700	1850	2100	2050
75 Min.	1900	2050	2300	2350	2500	1900	2000	2250	2240	2300	1700	1850	2050	2100	2100	1550	1600	1950	2050	1900
300% MODULUS (PSI)																				
15 Min.	850	950	950	1300	1350	850	1000	1100	1500	1500	900	900	1350	1500	1700	950	950	1350	1950	1900
30 Min.	1050	1200	1400	1450	1650	1100	1350	1450	1600	1600	1150	1250	1550	1850	1900	1200	1800	1700	....	....
45 Min.	1050	1350	1450	1600	1700	1150	1400	1550	1650	1850	1150	1200	1550	1850	1950	1200	1650	1750	....	....
60 Min.	1050	1300	1400	1600	1700	1100	1400	1550	1700	1800	1150	1300	1500	1700	1950	1150	1650	1700	....	....
75 Min.	1000	1300	1450	1600	1700	1100	1400	1550	1700	1800	1100	1250	1450	1800	1900	1150	1550	1650	....	....
200% MODULUS (PSI)																				
15 Min.	400	450	450	650	650	400	650	600	600	600	450	700	750	800	950	450	500	750	1250	1200
30 Min.	450	500	550	750	900	500	750	800	850	950	600	800	850	1000	1150	600	1000	1000	1500	1500
45 Min.	450	500	600	850	950	500	750	800	850	1000	600	800	850	950	1150	600	1000	1000	1500	1500
60 Min.	450	550	600	800	1000	500	750	750	850	1050	600	750	800	1000	1150	550	1000	1000	1600	1500
75 Min.	450	500	550	800	950	500	750	750	800	1050	550	800	800	1000	1100	550	1000	950	1550	1400
%ELONGATION																				
15 Min.	500	500	500	560	500	550	450	450	500	500	550	450	475	450	400	490	400	400	330	300
30 Min.	450	400	450	470	450	450	400	400	450	410	420	420	400	350	350	380	300	320	270	260
45 Min.	450	430	430	420	450	450	350	400	410	410	400	400	390	350	320	350	320	340	260	250
60 Min.	450	430	440	420	420	400	350	390	400	400	400	390	380	350	340	370	320	320	250	260
75 Min.	450	390	400	400	420	450	350	380	390	400	400	390	400	350	330	360	320	340	250	260
HARDNESS, SHORE A																				
30 Min.	53	56	58	60	62	52	55	57	59	60	53	55	58	59	62	56	60	62	65	68
45 Min.	53	57	58	60	63	52	57	58	60	61	53	55	58	60	62	56	60	62	65	68
TEAR RESISTANCE (WITH GRAIN)																				
Unaged (lbs/in)	146	153	158	220	190	158	155	164	173	158	143	160	165	175	160	143	153	152	153	135
T.T. AGED 24 hrs. @212°F. (lbs/in)	133	128	153	190	170	103	120	160	150	145	133	135	153	155	145	127	130	143	143	130
GOODRICH FLEX																				
% Perm Set	5.8	6.2	7.0	11.4	15.1	5.1	6.0	7.0	9.3	10.0	4.0	4.1	6.0	10.7	12.2	4.4	4.5	7.2	12.9	16.2
△T—°F.	45	46	47	54.0	60.0	41	44	46	50	55	22	22	32	45	56.0	24	34	41	78	102
GOODYEAR HEALY																				
% Rebound	70	69	65	64	62	72	71	69	69	65	77.0	74.0	70.7	70.1	67.0	76.9	72.5	72.3	69.0	66.2
COMP. SET - METHOD B - 22 HRS.@158°F.																				
% Orig. Deflect.	21.6	23.3	25.5	26.8	27.6	22	24	25	27	30	19.5	21.9	22.1	23.9	29.2	15.9	17.1	18.3	19.7	19.8
DEMATTIA FLEX CRACK RESISTANCE																				
M Flexes to .50" Crack	3.9	11.3	54.8	664.3	500.0	3.4	5.4	73.1	118.7	70.6	1.1	1.0	1.1	1.0	6.2	3.7	1.0	1.5	1.0	1.0
PICO ABRASION INDEX	120	130	166	200	225	117	125	135	175	200	70	78	96	107	115	50	59	64	68	76
AGED PHYSICAL PROPERTIES																				
CURED @284°F																				
TENSILE STRENGTH (PSI) AFTER T.T. AGING 24 hr. @ 212°F																				
15 Min.	1400	1550	1900	2100	2200	1450	1350	1950	1900	1900	1400	1550	1900	1700	2100	1000	1150	1800	1800	1950
30 Min.	1400	1450	2000	2050	2150	1450	1400	1800	1750	2150	1400	1450	1700	1850	2100	1000	1050	1850	1800	2000
45 Min.	1500	1350	1900	2000	2300	1400	1450	1900	1950	1900	1300	1300	1850	1900	2100	1050	1100	1900	1850	1900
60 Min.	1350	1400	1900	1900	2450	1450	1500	1850	1900	1950	1450	1400	2050	1900	2150	1100	1150	1900	1900	2100
75 Min.	1400	1450	1900	2100	2200	1600	1450	1950	2000	2000	1450	1450	2000	1800	2300	1250	1300	1950	1900	2000
200% MODULUS (PSI)																				
15 Min.	850	300	1050	1400	1450	900	950	1300	....	1600	1000	1500	1550	1700	1800	1000	1150	1750	....	....
30 Min.	800	850	1000	1500	1400	900	900	1200	1500	1650	900	1400	1500	1850	1700	950	1000	1800	....	2000
45 Min.	800	850	950	1400	1400	850	850	1200	1800	1500	850	1300	1550	1900	1650	900	1050	1850	1850	1900
60 Min.	750	800	950	1350	1350	800	900	1150	....	1500	850	1400	1600	1850	1600	850	1100	1850	1900	2050
75 Min.	750	800	900	1300	1350	750	950	1100	1700	1450	850	1400	1650	1750	1550	850	1250	1900	1900	1950
%ELONGATION																				
15 Min.	260	270	290	280	260	270	175	250	190	220	275	270	275	200	225	200	200	220	180	180
30 Min.	280	290	300	290	260	280	200	260	200	250	275	270	275	200	250	210	210	250	190	200
45 Min.	290	290	300	300	280	290	250	280	250	240	275	200	275	200	250	220	230	250	200	200
60 Min.	270	280	300	280	300	300	150	280	190	250	275	200	310	220	260	230	240	250	200	210
75 Min.	300	290	300	300	280	320	240	290	220	250	300	210	310	220	280	270	250	270	200	210
HARDNESS, SHORE A																				
30 Min.	61	63	65	66	68	60	63	65	67	67	59	63	65	69	70	62	64	67	70	72
45 Min.	60	64	65	67	69	59	62	64	67	69	58	62	64	68	69	62	64	66	69	70

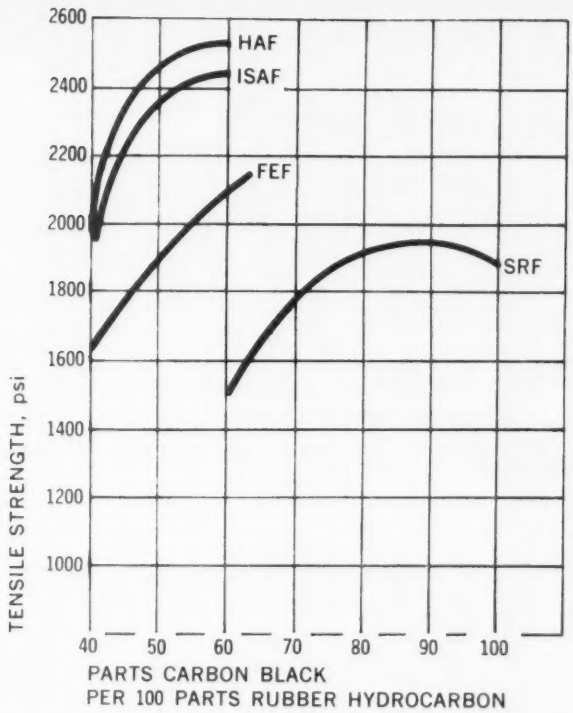

FIG. 1—Effect of carbon black on unaged tensile strength, 45 minutes at 284°F.

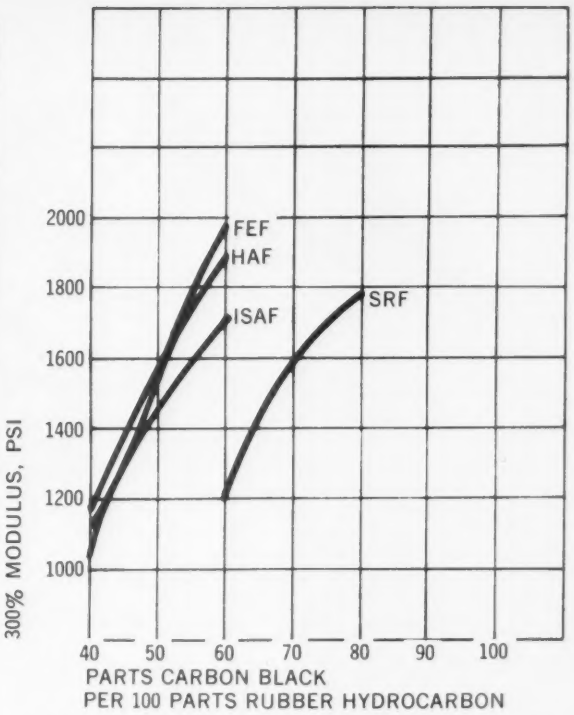

FIG. 2—Effect of carbon black on unaged 300 per cent modulus, 45 minutes at 284°F.

per cent Ameripol CB compounds, i.e., two-step Banbury mixes wherein all ingredients except sulfur and accelerator were added in the first mix then, after overnight aging, the accelerator was added during the second Banbury mix. Sulfur was added on the sheet-out mill.

The test data presented in this study were obtained in accordance with the procedures listed in Table I.

Effect of Blacks

To summarize the work presented in detail in the accompanying table and graphs (Table II and Figures 1-6), it can be seen that ISAF and HAF produce tensile strengths which are essentially the same for equivalent loadings but moduli imparted by ISAF are slightly lower and ultimate elongations are slightly higher. This may account for the better flex cracking resistance of ISAF. The abrasion resistance of ISAF, as measured on the Pico abrader is somewhat superior to HAF and this has been confirmed by road tests. HAF produces slightly lower permanent set and hysteresis heat rise than ISAF but these differences are small.

FEF, as expected, produces lower tensiles and higher moduli than the harder blacks and noticeably lower elongation values with lower flex-cracking resistance. This black also produces low set values and low hysteresis heat rise. While abrasion resistance is, for the most part, quite low as compared to HAF and ISAF in equivalent loadings, it is rather unexpected to find that 55 and 60 part loadings of FEF show better abrasion resistance than the 100 index Pico control based on a 100-level first line tread compound.

SRF, like FEF, is less reinforcing in Ameripol CB than HAF and ISAF, i.e. lower tensiles, and in the 60 part loading range, moduli and elongation are

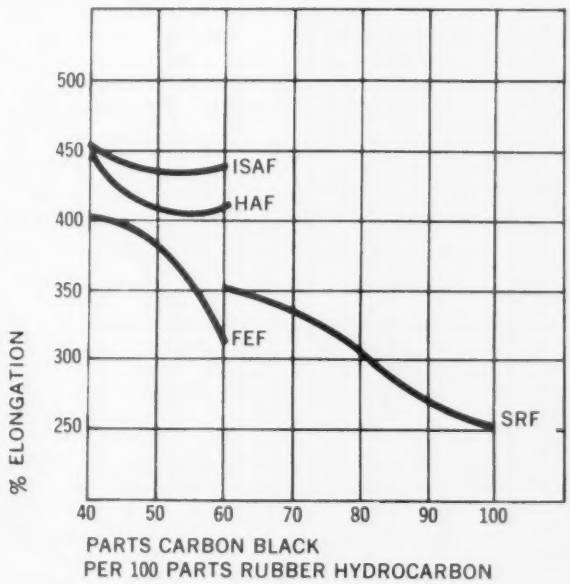

FIG. 3—Effect of carbon black on elongation, unaged, 45 minutes at 284°F.

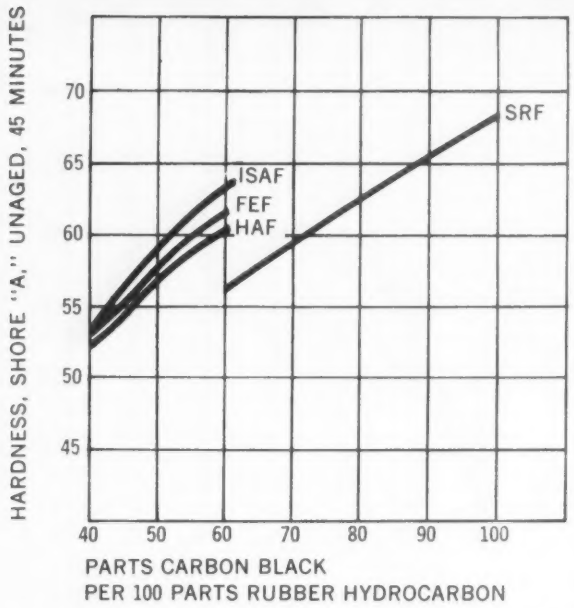

FIG. 4—Effect of carbon black on Durometer hardness, 45 minutes at 284°F.

lower than for an equivalent loading of HAF or ISAF. Hysteresis heat rise and per cent set are appreciably lower. Flex cracking resistance imparted by SRF in 100 per cent Ameripol CB compounds leaves much to be desired compared to HAF and ISAF.

Conclusions

Data and discussions presented here are oriented primarily for the use of the rubber compounder who may be evaluating Ameripol CB for the first time. Theoretical considerations have been avoided, and a "do-it-yourself" approach has been followed. An effort has been made to provide the basic formulating,

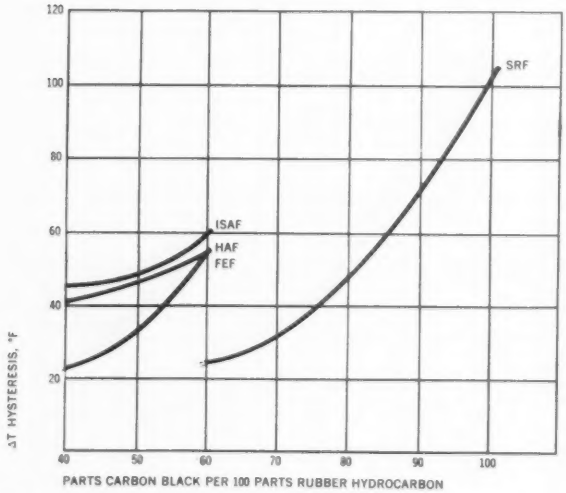

FIG. 6—Effect of carbon black on hysteresis, heat rise, optimum cure.

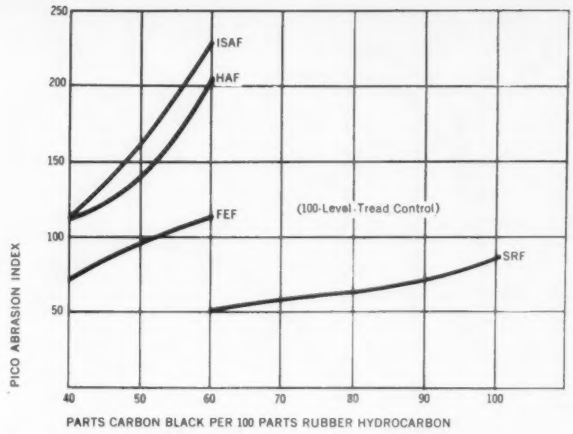

FIG. 5—Effect of carbon black on Pico abrasion index, 45 minutes at 284°F.

mixing and compounding information so that the new rubber can be evaluated in confidential and proprietary recipes.

Instructions are provided for both internal mixing and mill mixing of Ameripol CB compounds of two types: the first, with Ameripol CB as the only rubber hydrocarbon in the recipe and the second, blends of Ameripol CB with natural rubber and/or SBR.

A cursory reading of these mixing instructions indicates that there is little difference between the behavior of Ameripol CB and the better known polymers and this is true. The one outstanding difference, however, is the necessity for allowing two-step mixed 100 per cent Ameripol CB compounds to age overnight between the first and second step. This simple phase of the mixing procedure allows time for the composition to change from a relatively dry, low tack mass with low green strength to a stock resembling natural rubber in its handling and processing characteristics. This aging period is not as critical in blends of Ameripol CB and natural rubber.

Summary

General guidance is provided for building an Ameripol CB compound. Included are recommendations for antioxidants, accelerators, plasticizers and other compounding ingredients. Although detailed tabulations of the specific effects of these materials are beyond the scope of this introductory article, each group of compounding ingredients will be treated separately later.

In the carbon black section of this article, four of the larger volume furnace blacks are compared in 100 per cent Ameripol CB formulations in five concentrations each (Table II). In this section, detailed test data have been presented. Other blacks as well as mineral pigments will become subjects of future reports.

Recommendations are also made for extruding, calendering and splicing Ameripol CB compositions.

Depolymerized Rubber: New Compounds and New Uses

By

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First introduced commercially some twelve years ago, depolymerized rubber has become a staple product in the rubber manufacturing industry and is utilized for a growing number of applications. The properties and applications of depolymerized rubber, when first introduced, were covered in a comprehensive article in the January, 1950, issue of RUBBER AGE. *The present report brings the literature up to date and covers the latest developments in the field, particularly formulations for rapid self-curing at room temperature and the introduction of synthetic DPR (polyisoprene) in liquid elastomer form*—EDITOR

THE last several years have seen a rapid expansion of the markets for the so-called liquid rubbers, a trend likely to be accelerated thanks to recent technological improvements in this field. Chemically, the liquid rubbers are rubber molecules of relatively low molecular weight, but otherwise identical to the higher polymers which make up conventional plastomers. Physically these products are liquids of low to high viscosity.

Because of their fluidity, liquid rubbers can be extruded, cast, or poured, without solvent, into almost any desired shape. If the polymeric molecule is reactive, the formed liquid rubber can be cured or vulcanized in place to yield a solid elastomer. The more reactive the molecule is with appropriate curing systems the better it can be formed into solid elastomers.

A formulation for rapid self-curing of depolymerized rubber at room temperature, and the introduction of synthetic rubbers in liquid elastomer form are two of the more important recent developments.

As a class, liquid rubbers offer the following main advantages to the processor:

(1) Because of their relatively low viscosity, they can be easily cast. They can be formulated in comparatively light-duty mixing equipment, such as Hobart mixers, standard bread dough mixers, etc.

(2) Product properties may be varied widely by suitable formulation.

(3) Product can be cured without significant shrinkage.

Basically, there are two classes of liquid elastomers on the market today. The first of these, unreactive liquid polymers, cannot be vulcanized into solid form. The most important example of this group is polyisobutylene. The saturated liquid rubbers are used, above all, in cable insulation compounds, pressure-sensitive adhesives, caulking and sealing compounds, and the like.

The second class, reactive liquid polymers, are reactive with curing systems so that they will vulcanize to rubber-like products. They can be cast or poured (Figure 1), since they are flowable at essentially 100 per cent solids content. The main commercial representatives of this group are shown in Table I.

It is significant that depolymerized natural rubber is the most important commercially available, chemically reactive liquid elastomer produced from a low cost, general purpose rubber. Experience at this laboratory suggests serious limitations at room temperature in the vulcanization of cast liquid rubbers produced from GRS or polybutadiene.

Liquid elastomers produced from several specialty rubbers, however, are finding growing acceptance in areas where particular requirements can justify their higher cost. Conditions calling for their use parallel

Depolymerized Rubber—A Summary

▶ Of the growing list of liquid rubbers and rubber-like elastomers, depolymerized natural rubber appears the most versatile and reactive, curing to a wide range of physical properties. Shore hardnesses from 10 to 70 can be obtained by the use of new room temperature vulcanizing systems based on *p*-quinone dioxime and lead dioxide. Setting up times can be varied from a few minutes to many hours. Electrical properties of these compounds are good, and they age as well or better than most conventional soft rubbers.

TABLE I—CLASSIFICATION OF LIQUID RUBBERS

Type	Method of Curing	Product Properties, Main Uses, etc.
Depolymerized Natural Rubber (DPR)*	(1) Heat-curing, sulfur as vulcanizing agent. Compounded by user to own requirements	May be cast and cured *in situ*. Product approximates the various forms of natural rubber depending on method of processing. Low cost. Wide range of applications (electrical and other molded products); see discussion below
	(2) Self-curing at room temperature. Two-part system, using lead dioxide and p-quinone dioxime jointly as curing agents	
Styrene-butadiene	Known formulations limited in reactivity at room temperature	
Butadiene-acrylonitrile	Not readily cured at room temperature. A recently introduced modification containing carboxyl groups can be vulcanized at elevated temperature	
Polysulfides	Two-part system, cured at room temperature by oxidizing agent	Resistant to oil, solvents, ozone, sunlight. Used as sealants for aircraft wing tanks, boat caulking, curtain wall sealant, etc.
Silicones	Two-part system, cured at room temperature or elevated temperature	Good physical and electrical properties over wide temperature range (—150 to +600°F.). Good resistance to ozone, aging, sunlight, weathering, and oil. Used in coating pastes, adhesives, and in sealing, caulking, potting, and encapsulation compounds. Relatively high in cost.
Urethanes	Two-part system, cured at room or elevated temperature	Good resistance to oil, solvents, oxidation, and ozone. Good resilience, abrasion resistance, tensile strength. Used in mechanical rubber goods, solid tires, protective coatings, etc.

* Registered Tradename

those for which the corresponding fabricated rubbers are employed, i.e., oil resistance (polysulfides), high-temperature service (silicones), and very high wear demand (urethanes).

Among liquid rubbers, a large amount of commercial experience has been accumulated with depolymerized rubber (DPR). This product of DPR, Inc. may therefore serve to illustrate the scope of liquid rubbers and the techniques which serve in their application. Specifically, this discussion will consider formulations and methods of curing, product properties, and fields of application.

Depolymerized rubber is obtained by treating crude natural rubber under carefully controlled conditions of temperature, time and pressure, so as to reduce its molecular weight and, therefore, its viscosity. While it is possible to obtain intermediate degrees of fluidity, two grades of DPR are presently available as commercial products. Their properties are as follows:

Grade	Approximate molecular weight (light-scattering method)	Viscosity at 150°F., cps (Brookfield Synchro-lectric viscometer)
Low-viscosity	7,000	12,000
High-viscosity	11,000	65,000

Other properties, common to both grades, are as follows: ash, 0.5-1.2%; volatile matter, 0.1%; specific gravity, 0.92 at 25°C.; color, light brown in thin film. The materials are chemically and physically stable for years when stored in covered drums at room temperature. Viscosities intermediate between the high and low may be obtained by blending the two.

Like ordinary rubber, DPR is a polymer of isoprene with the general formula ($C_5 H_8$). However, owing to the depolymerizing step employed in its manufacture, the molecular weight of DPR is substantially less than that of crude rubber. The practical importance of this reduction in molecular weight is a decrease in the product's viscosity, which in turn permits its convenient use in applications which benefit from a fluid raw material. Such applications will be discussed below.

Chemical reactivity of DPR is similar to that of natural rubber except that its slower rate of incipient curing requires compensation, and its vulcanizates weather better than high molecular rubber compounds, even without the presence of antioxidants.

DPR is poured or extruded and cured in place without significant shrinkage. As the physical form of the rubber is different from the conventional natural rubber, it cannot do exactly the same things, but in its own individual manner can do many things ordinary rubber cannot.

Formulation of the compound depends on the intended use. As in the case of conventional rubber, the compounder can vary curing behavior and product

properties widely by choice and quantity of vulcanizing agent, filler, and accelerator. Two basic types of formulation are available today; the newly developed non-sulfur self-curing system and the well established heat-curing (sulfur-vulcanized) system.

Self-Curing Systems

Perhaps the most novel and practical curing system for DPR liquid compounds is the *p*-quinone dioxime/lead dioxide combination. Used with other specific materials, this makes possible room-temperature vulcanizing without sulfur to the soft rubber stage. Practical curing times can be chosen by varying formulation. Hardness can be ranged from very resilient rubbery gels up to firm, lively stocks of Shore hardness of 60 or 70. A basic example demonstrating a typical combination follows:

		Parts by weight
A	DPR, Low Viscosity	100.0
	GMF (p-quinone dioxime)	5.0
	Silica, clay, etc. as desired	100 ±
	d-Limonene	20.0
	Triethanolamine	2.0
B	Activator PbO_2	10.0
	Dibutyl Phthalate	5.0

In practice, the compound is made up in two parts. The base, part A, contains DPR, GMF, diluent, fillers, and triethanolamine. Part B is lead dioxide, wetted with half its weight of dibutyl phthalate to facilitate its dispersion. When parts A and B are mixed, they remain flowable for about 10 minutes at room temperature. It is noteworthy that there is an unusually low exotherm. Vulcanizing progresses and viscosity increases with no significant exotherm. After a few hours the final curing levels off and reaches close to a maximum in 20 hours at room temperature. Pot life can be varied, however, by adjusting the triethanolamine content of the mix.

The theoretical explanation of the curing system (shown above) is not fully known. It is interesting that lead dioxide is peculiarly important, being far more reactive in this combination than other peroxides or any other lead compound. Lead dioxide and GMF are more specific here than when either compound is used in butyl or polysulfide polymers.

The d-Limonene (derived from citrus peel and a product of Suni-Citrus Products Co., Haines City, Florida) is isomeric with natural rubber, is chemically $C_{10}H_{16}$, and is a viscosity-reducing liquid which apparently co-vulcanizes to some extent with depolymerized rubber. It serves as an extender and is mildly accelerating, increases final hardness somewhat, and by fluidizing makes higher volumes of filler possible.

The chemical formula of triethanolamine is $N(CH_2{\cdot}CH_2{\cdot}OH)_3$. The rubber system would vulcanize without it, but at a much slower rate.

p-Quinone dioxime is $HO{\cdot}N{:}C_6H_4{:}N{\cdot}OH{\cdot}$; together with the PbO_2 they provide the key curing combination. Wetted in paste form, the lead dioxide is not dusty and disperses easily in part A of the two-part formulation.

Fillers are practically always required. As bulk

FIG. 1—Poured-in-place gaskets adhere if metal is primed . . .

. . . or lift out if metal is lubricated.

fillers, many kinds of silica, clays, and calcium carbonates, such as Atomite, can be used in weight proportions greater than the DPR. Other fillers include zinc oxide and zinc sulfide which are particularly useful when color lightening is desired. These fillers are valuable in compounds of the flowable and self-leveling class.

Thixotropic fillers include Cab-O-Sil, Bentone 34 or Santocel. These fillers have great particle surface area and only relatively small amounts by weight can be added to DPR compounds before they become too stiff to flow. Troweling compounds for overhead areas, or crack sealants for vertical application without sagging, can be produced with such fillers.

There are many specialty fillers, including carbon blacks, acetylene black for conductive rubbers, aluminum of various meshes, or milled glass fibers, which can be incorporated to achieve appropriate effects. The inherent dark color of lead dioxide/DPR compounds limits the color possibilities by addition of colorants.

When cast into a form or mold open at the top, these basic DPR compounds self-cure with a tacky surface, exposed to the air. This is inherent, and where such tack is objectionable, the surface can be dusted with fillers such as clay or talc. This surface tack seems to be a phenomenon involving air. In dark storage the tack persists for months, but in direct sunlight the surface dries through oxidation. When cast and immediately covered with water, the com-

pound vulcanizes at room temperature normally, and without any surface tack or significant absorption of water.

The low-temperature self-curing system described above is a recent discovery. It is expected to provide major impetus to the use of liquid rubber which, heretofore, has been wholly dependent on sulfur-curing systems. Nevertheless, there will continue to be significant areas of application for surfur-cured DPR and its technology must therefore be given consideration.

By varying composition of sulfur-curing mixes, the processor can attain a wide range of product properties. The general approach may be illustrated by two typical formulations. For the production of medium to hard rubbers, the following formulation is typical in DPR processing:

	Parts by weight
DPR, Low Viscosity	100.0
Sulfur	10-50
Silica, Clay, etc.	50-100
Bardol	10.0
Diphenyl Guanidine	1.0
Calcium Oxide	10.0

As in conventional rubber compounding technology, the accelerator, filler, or sulfur content may be varied for soft or hard rubbers for different applications. (The sulfur however must be of an easily dispersible variety.) The above range is for heat-curing purposes. With 50 parts of sulfur, this compound may be cast or spun, and cured in a hot air oven to a high quality hard rubber. Thin sections can be vulcanized at 275°F.; heavy sections should be started at perhaps 250°F.

The Bardol is a reactive extender, having a liquifying effect on the viscosity of the DPR and allowing additional fillers. It has accelerating effect and co-vulcanizes particularly well. The quicklime (calcium oxide) has the valuable ability to prevent porosity in cast DPR sections *(28)*. Fillers can be chosen from the above-cited list, as required, to achieve self-leveling or thixotropic consistencies.

Soft rubbers are formulated with lower sulfur and filler content; one semi-self-curing formulation for production of soft stocks is as follows:

	Parts by weight
DPR	100.0
Sulfur	5-10
Zinc Oxide	5.0
Diphenyl guanidine	1.0
Zinc diethyl dithiocarbamate	1.0
Filler	As appropriate

This stock may be cured in 2 or 3 hours at 175-200°F., or it will self-set at room temperature in about a week.

For room temperature vulcanizing with sulfur, the curing rate is much slower than with GMF-PbO_2, and the Shore hardness is lower. Several days at 72°F. are necessary to gel the following example:

	Parts by weight
DPR, Low Viscosity	100.0
Sulfur	5-20
ZnO	10.0
CaO	10.0
Filler (silica, clay etc.)	50-as required
Butyl Eight or Merac	5.0
Bardol	10.0

An interesting caulking compound that is a one part, non-curing, non-oxidizing paste that does not sag, even at 275°F. is as follows:

	Parts by weight
DPR Low Viscosity	100.0
Polybutene 32	100.0
Hi Sil 233	88.0

Mixing of DPR Formulations

DPR formulations can be mixed in standard equipment used for bread doughs, such as the Hobart mixer, or heavy duty sigma-blade mixers, change can mixers, or slow-moving churns with paddles and arm. The consistency of the final compound has much to do with the choice of mixer, but generally the mixer is not as critical as its speed relative to consistency.

DPR has remarkable wetting power. The dry materials are usually added to the DPR first, to allow frictional rub-out and smooth dispersion free of agglomerates. Only a few fillers require presifting provided they are dry and not caked.

For maximum electrical properties no moisture should be present, of course. Interspersed with the fillers as they are mixed into the rubber, some liquid constituent such as Limonene or Bardol can be added to keep the viscosity within practical limits of the mixer. When smoothed out, the remainder of the liquids—reactive or non-reactive—should be added. Due to agitation, some warmth is generated during the mixing which lowers the viscosity of the compound; in some cases heat can be applied to warm DPR to lower viscosity.

For maximum wetting of filler or color particles a three-roll paint mill is unsurpassed. Splendid dispersions and masterbatches are thus obtained. However, this roller milling tends to reduce the potency of calcium oxide for preventing porosity, and it also tends to intensify colorants.

As mentioned above, rapid room-temperature-vulcanizing (self-curing) DPR compounds are made up in two parts. The DPR, *p*-quinone dioxime and diluents, fillers and triethanolamine constitute the base, or Part A, of the compound. This combination is stable, as to viscosity and potency, for months at ordinary storage temperatures of summer and winter.

Part B is lead dioxide wetted with about half its weight of dibutyl phthalate. The best dispersion of these two ingredients is achieved in a three-roll paint mill, but simple mixing of the paste is satisfactory although some separation of dibutyl phthalate may take place in Part B after prolonged standing. For most purposes, this is not objectionable for the two separate parts are stirred together uniformly in required proportion before application. At this point, slow, careful stirring reduces entrapped air bubbles.

For most uses there is not enough air porosity to be objectionable. Where this aspect is important, however, vacuum mixing as used with other viscous materials can be resorted to. Volatile non-reactive diluents such as toluol reduce viscosity but some shrinkage becomes evident after curing, owing to evaporation.

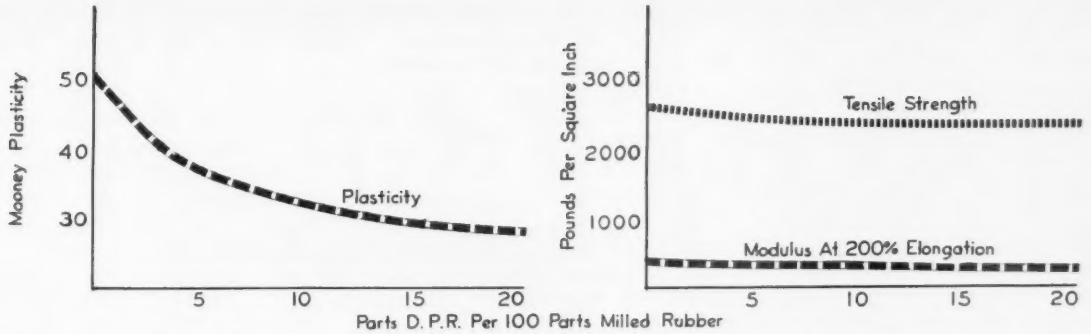

FIG. 2—The effects of additions of DPR to a natural rubber compound are shown by these graphs: on the left, Mooney plasticity, on the right, tensile strength and elongation.

Characteristics of Cured Product

The properties of rubber obtained by curing DPR can be varied widely, depending on vulcanization conditions. As a general rule, the product is similar to conventionally produced rubber. However, special attention must be called to the following points.

Chemical resistance and aging: DPR vulcanizates weather better than conventionally produced rubber compounds, even in the absence of antioxidants. Quite generally, these products exhibit excellent resistance to moisture and about the same general tolerance and susceptibility to organic solvents as conventional natural soft rubbers. Ozone resistance is three times better than that of natural rubber compounded and cured by conventional methods.

In the newly introduced DPR compounds, cured at room temperature, accelerated (oxygen-bomb) aging produces no significant effect on appearance of deformation properties, in four days at 70°C. From this it may be judged that DPR compounds in moderate environments will function satisfactorily in lengthy service.

Physical properties: Soft rubbers based on DPR exhibit relatively low abrasion resistance and tensile strength. (Tensile strength of a ⅛ inch slab of self-cured rubber is 250 psi; elongation is 50%.) They are well suited for applications where the rubber is not required to provide major structural strength.

Cured DPR-based stocks have good low temperature flexibility and ability to tolerate temperatures of 180°F. for prolonged periods. Thus, a temperature of 150°F. produces very little change in the deformation behavior. At —20°F. there is some stiffening but the recovery after release of pressure is high enough to show that the elastic properties are still active. This temperature effect is summarized quantitatively in Table II.

Electrical properties: These, also shown in Table II, are all within the usual range associated with soft, filled rubber compounds.

The newly developed DPR, cured without sulfur, is free of the corrosive or tarnishing effect on silver and copper which is often an objection in sulfur-cured rubbers.

DPR gelled around brass, polyethylene, and various molded plastics exhibits a strong "cling" (not actual adhesion) to these base materials. Excellent adhesion to metal of room temperature-vulcanized compounds can be accomplished by first priming the metal with a material such as Chemlok 220.

Applications

The flowable characteristics of uncured DPR compounds allow many advantages in molding and fabrication. With the exception of tensile and elongation in the cured rubbers, the chemical and other properties are similar or better than those of natural rubber. The various DPR formulations are useful for filling voids with a non-shrinking rubber over a range of rubbery hardnesses, at room temperature if desired, and without significant heat build-up even in thick sections.

DPR and its compounds are used in three basic forms—as uncured, soft rubber, and hard rubber. Within this framework, a wide range of properties may be provided by varying types and amount of filler, accelerator, and curing system employed, as outlined above.

Uncured depolymerized rubber serves as vulcanizable non-extractable plasticizer in crude rubber mixes as shown in Figure 2. Its use in this function decreases breakdown time on the mill, with little loss of tensile strength and modulus of the vulcanizate. Uncured DPR is also an excellent grinding medium for production of color and pigment masterbatches. This is due to the outstanding wetting and dispersing ability of depolymerized rubber.

Cured soft rubber from DPR finds a very wide range of applications which may be illustrated by a few examples. In electrical uses it serves as moisture sealant and an insulating material. Low-resistance formulations perform as shielding for high-frequency cables and high-resistance (>500,000 megohms) formulations serve effectively for cable connector sealants and as void fillers in cable construction.

In shock absorption applications self-vulcanizing compounds are used for embedding delicate parts (e.g. electronic components) and vibration damping.

Soft, resilient potting compounds, which are practically free of shrinkage, may be made with DPR. The reaction is accompanied with very low exotherm.

TABLE II—TEMPERATURE EFFECT ON DEFORMATION, AND ELECTRICAL PROPERTIES

Effect of Temperature on Deformation

	Force to Deflect 10% (psi)	Recovery, 3 seconds after release (%)
At 70°F.	57	90
At 150°F.	42	95
At —20°F.	160	78

Electrical Properties

Dielectric Constant and Dissipation Factor

	Average thickness, (inches)	Effective Diameter of Test Electrode, (inches)	Dielectric Constant	Dissipation Factor	Loss Factor*
@ 60 cycles/sec.	0.1191	3.07	4.93	0.0086	0.42
@ 1,000 cycles/sec.	0.1191	3.07	4.76	0.0110	0.052

Volume Resistivity @ 500 volts direct current

Active thickness, (inches)	Effective Area of Test Electrode, (sq. in.)	Volume Resistivity	
		megohm-inches	ohm-centimeters
0.1191	7.40	2.3×10^6	5.8×10^{14}

Dielectric Strength @ 60 cps. (Tests made under oil)

Test No.	Kilovolts at Puncture	Thickness, mils.	Volts per mil.
1	42	120	350
2	41	125	328

Room Temperature: 25°C. Relative Humidity: 50%

Note: These samples "flashed over" at 29 kilovolts in air. The time of immersion in oil before puncture was approximately one minute.

* Product of the dielectric constant and the dissipation factor.

Liquid rubber can be used as a troweling compound where the compound must not sag from vertical walls during vulcanizing.

As adhesives, self-cured DPR compounds, exposed to air, develop a pronounced surface tack and may well be suitable for production of pressure-sensitive adhesive tapes by very rapid means. While the basic compound is more expensive than adhesive cements generally used, overall savings can be attained because milling or Banbury mixing is eliminated, and because solvent recovery apparatus along with its incidental complications is made unnecessary. The DPR compound may be mixed from two separate parts, spread by a blade to a backing drawn under at whatever coating thickness is desired, and cured rapidly under lamps or hot air. This leaves a tacky surface, rolled in separating film and slit to the required width. These adhesive tapes appear to exhibit good aging qualities. This, therefore, is a unique means of producing adhesive tapes without costly use of organic solvents.

While the following suggested formula may not be the best eventually for pressure-sensitive tapes, it can be used as a basis for further experimenting:

	Parts by weight
Low viscosity DPR	100.0
GMF	5.0
PbO_2	5.0
Atomite	100.0
Limonene	10.0
Nujol mineral oil	10.0
Triethanolamine	2.0

DPR may be used as expansion joint sealant between concrete slabs or metal plates on road construction. It is particularly attractive in this service because it does not become excessively soft in use at elevated temperature, as do conventionally used

FIG. 3—This washer-like gasket was cast in an open mold.

tars, asphalts, thermoplastics, etc., nor does the vulcanized compound contract excessively or become brittle at low temperatures. Certain DPR compounds have passed a cycling test of temperatures ranging from −40 to 140°F.

Poured-in-place gaskets, one of which is shown in Figure 3, can be produced, and large heavy rubber gaskets for heavy pipe and connections can be cast in low-cost molds at a fraction of the cost of molded rubber parts *(29)*.

Low viscosity DPR compounds have long been used for the production of printing rolls by the casting method. DPR has also been used as an ingredient in certain printing inks.

Hard rubber cured from DPR compounds is of high quality, and closely approaches hard rubber made by the well known, conventional methods. In this area, an important application for DPR is as binder in the manufacture of grinding wheels, bowling balls, for the setting of bristles of paint brushes, and to some extent for corrosion resistant linings *(24)*.

As the newer synthetic elastomers come into greater prominence a need for synthetic depolymerized rubbers may be evidenced. To this end, we have now under laboratory development a synthetic DPR closely related to natural, essentially, liquid polyisoprene. This counterpart is lighter in color and lower in viscosity than natural DPR, but otherwise behaves almost the same in compounding and resultant properties. This new development will provide an alternative source of supply for many consumers of depolymerized rubber.

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Odor Control in Rubber Products and Rubber Processing

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Aromatic chemicals can be used to mask unpleasant malodors and also to impart appropriate substitutes

THE rubber industry is one in which manufacturers have come to rely more and more on aromatic chemicals as essential ingredients in their products. Sometimes the desired effect is achieved by the addition of specific and recognizable odors. More often it is obtained by counteracting or masking inherent malodors.

During World War II, when rubber from the Far East was unavailable, chemists developed the synthetic latices which helped to take the place of the natural. Unfortunately, the combinations of chemicals used for these compounds frequently resulted in end products with objectionable malodors. When the war ended, the government-owned rubber facilities were taken over by private enterprise.

Some of the first commercial products produced then were attractive and practical foam rubber pillows and mattresses. But the same malodor that was tolerated in wartime hindered the sale of these otherwise acceptable consumer goods. It was at this time that the rubber producers turned to the aromatic chemical companies for help. These manufacturers, by employing various aromatic chemicals, compounded odor-counteracting agents which could be added to the rubber mixes before processing. They withstood the curing temperature, eliminated the styrene odor, and gave the foam rubber a neutral end odor.

As a result of continuing development, and experimental work with new chemicals and processes since those early postwar days, the number of new rubber compounds has been greatly multiplied. The aromatic chemical industry has been forced to keep an attentive pace. By analysis of individual component chemicals used in the rubber industry, masking agents have been developed to counteract effectively practically any malodor from these chemicals or their combinations. Going a step further, the aromatic chemical industry has developed reodorants that can be introduced into the processing to impart specific, distinctive odors to any end product.

Advantages

What are the advantages of using deodorant or reordorant chemicals in the compounding of rubber and rubber products? The first and most obvious is the elimination of odors that either will make the end product unsalable or greatly reduce its sales potential. Second, in the case of reodorization particularly, certain items can be made much more acceptable by including aromatic chemicals to give them a specific odor. One company, for instance, greatly increased its sales of latex baby dolls by including chemicals in the latex formula which impart the odor of baby talcum powder to the finished product. (Another company added a chocolate odor to the compound they used to make dog bones when they learned that dogs like this flavor!)

The third important advantage has been of great help to rubber technologists in the development of better and/or less expensive compounds. It is the fact that they can utilize any chemical which will improve the product or reduce its cost, without worrying about what its inclusion may do to the

Photos courtesy of U.S. Rubber Co.

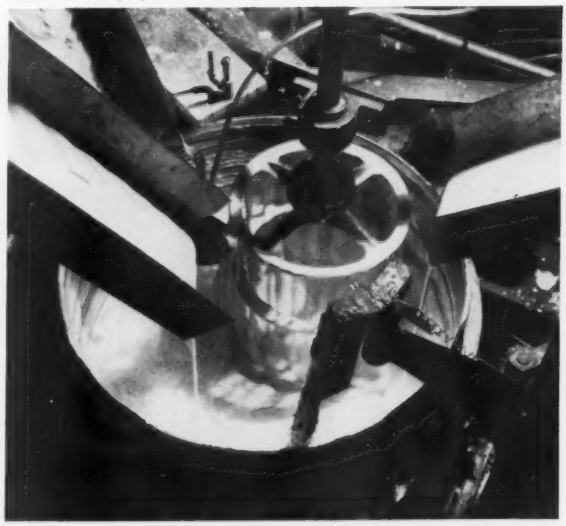

FIG. 1—Whipping millions of tiny air bubbles into foam rubber gives it resiliency and light weight. Odor control can be achieved by addition of aromatic chemicals.

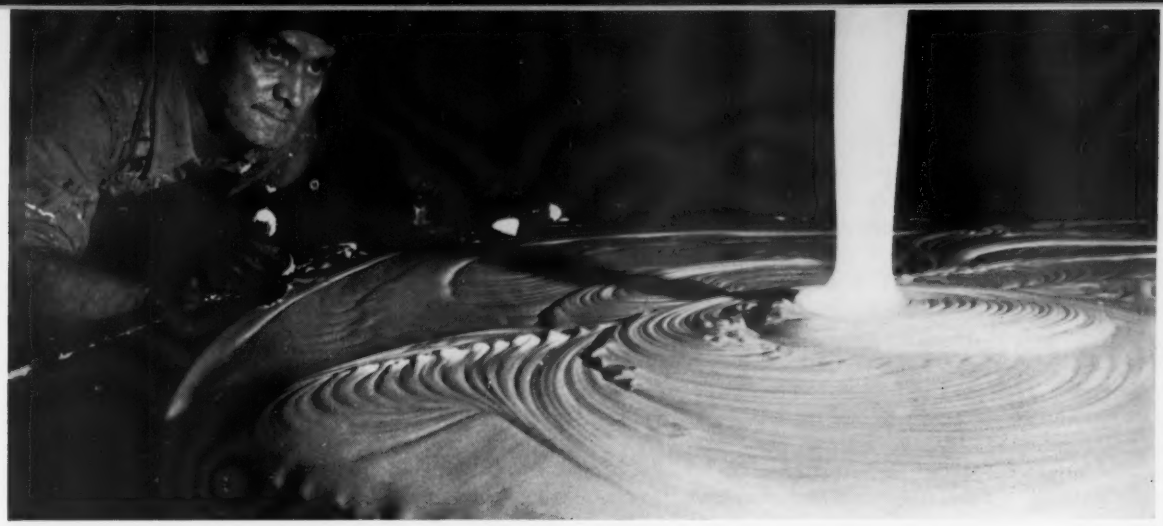

FIG. 2—White foam rubber, after being whipped, is poured into a mattress mold.

odor of the end product. The odor chemist will be able to eliminate or change that.

The odor in this case may be inherent in the compound. When the temperature rises it evaporates the chemical bearing the odor, and moisture carries it into the air. There have been numerous examples of this. Rubber thread used in the manufacture of girdles and bathing suits, when subjected to the heat of the body and perspiration or water, for instance, will give off its inherent malodors if the rubber used in the thread has not been deodorized, during processing, by the addition of odor counteractants.

The counteracting agents volatilize at a faster rate than the malodors and the result therefore is either neutral or a pleasant odor. The agents actually become a part of the malodor and will help to combat other outside malodors such as are encountered in ammonia or uric acid decomposition. Thus, they have found increasing acceptance with the manufacturers of latex baby pants.

In the case of foam (see Figures 1 and 2) or sponge rubber, the problem of odor is multiplied. Certain blowing agents frequently used to form the bubbles in sponge have a highly objectionable odor which becomes entrapped in the bubbles. In addition, the increased surface area caused by the bubble walls contributes to the odor problem. When pillows, mattresses, cushions or other items made from foam rubber come in contact with higher temperatures and humidity, the odors are slowly released and the bellowing action caused by flexing or compression drives these odors into the surrounding air.

Similar problems arise in other applications, and for their solution, considerable effort is occasionally required. One company was making bath mats with a rubber backing-compound. The mats had no odor until they were actually in use in the heat and dampness of a shower room. Rhodia, one of the leading firms in the aromatic chemical field, when consulted on this problem, was able to develop a special Alamask which has solved this problem completely.

The furniture industry uses curled animal hair sprayed with latex as filling for cushions. The hair is washed but still retains some natural animal oils. These gradually decompose and the odor carries through the rubber and takes the rubber smell along with it. Alamask treatment of both the hair and the latex has eliminated this malodorous condition. Almost all rubber compounds—GRS, neoprene, natural rubber, polyurethane, butadiene, etc.—have inherent, unwanted odors that can be "removed" by the use of aromatic chemical agents. Blowing agents and antioxidants contribute to the problems. In many cases the bulk addition of Alamasks during the compounding process will perform a double duty. In addition to insuring a neutral or pleasant smelling end product they also eliminate factory odors, thus improving atmospheric conditions for both community and employees. In natural rubber latices, ammonia is used as a fixative to keep the compound in suspension. Alamasks are used to eliminate this odor both in the plant and in the final product.

In still other cases, aromatic chemicals are used to counteract processing odors before they are given off into the atmosphere surrounding the plant. For odor control at blow-down, after vulcanization, Alamasks are sprayed into the exhaust ducts to eliminate the odors before they are released into the air.

When gearing a product to the industrial, institutional or household consumer many factors are taken into consideration, among them the basic appeal to the senses. Numerous studies have been made and numerous articles written about the effect of lighting and sound on production, and the influence of color in stores and factories on workers and the buying public. But we too often forget about the influence of the sense of smell. The importance of sight and touch varies with the consumer. For instance, the purchase of sponges or rubber drain boards may be influenced by the color scheme of the housewife's kitchen; at the same time color would play a much smaller part in a hospital maintenance man's choice.

The sense of smell, however, is usually taken for granted. Only when it is offended or unusually pleased is it appreciated. Through the use of odor masking agents in the plant, rubber manufacturers can counteract the objectionable odors given off in processing, eliminate malodors from end products, and give to them practically any type of distinctive aroma to enhance their sales appeal.

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Chemical Analysis of Alum-Coagulated SBR

A complete solution procedure gives more accurate values for organic acid than the current ASTM extraction test. It is also adaptable to determination of other gross constituents

A KNOWLEDGE of the chemical constituents of styrene-butadiene synthetic rubber (SBR) is useful in maintaining uniformity of production *(1, 2, 4, 5, 6, 7)*. One method of coagulation involves the use of salt (sodium chloride) and acid (sulfuric acid); another utilizes "alum" (aluminum sulfate) as coagulant. The "wet" E-T-A (ethanol-toluene azeotrope with 5% water) extraction method for organic acid in alum-coagulated SBR described in the ASTM Methods of analysis *(1)* gives low results for this constituent.

Similarly, low results are also obtained by the complete-solution procedure for SBR containing soap, which was described earlier *(6)*. A number of methods for organic acid determination were proposed during the course of the Government synthetic rubber program. These methods usually involved attempts to overcome interference from the aluminum ion. It appeared that the aluminum ion could either be titrated to give high results or tie up the fatty acid to give low results, depending upon the conditions of the test.

In the method described here an attempt is made to combine the aluminum with 8-hydroxyquinoline to prevent its reaction with sodium hydroxide and at the same time to free the total organic acid for titration.

It is shown how the methods previously described for the determination of soap, stabilizer, and bound styrene *(6)*, may with minor modifications be adapted to the analysis of alum-coagulated SBR using only a single weighed sample. This procedure affords a significant saving of time.

General Considerations

Total fatty acid radical in synthetic rubber latex before coagulation is distributed between sodium soap and free fatty acid. Coagulation with alum produces aluminum soap which is generally considered to be a mixture of indefinite composition of basic aluminum soaps and free fatty acid *(3)*. It is desirable to know the total fatty acid content of the coagulated rubber which includes that present as aluminum soap. The accuracy of tests for this constituent has usually been estimated by comparison with the value for the total fatty acid content of a sample coagulated with salt and acid from the same latex used to prepare the alum-coagulated sample.

Over a period of time, considerable evidence has been obtained in this and other laboratories to indicate that aluminum soaps and possibly other aluminum salts interfere in the determination of organic acid in alum-coagulated SBR. Some of this evidence is reviewed below.

(1) Low values may result when the titration is made either in an extract obtained with anhydrous E-T-A or in a solution of the rubber sample in an anhydrous 5:1 mixture of toluene and ethanol. These low values probably represent the total free fatty acid.

Abstract

► The current ASTM extraction procedure for the analysis of alum-coagulated SBR gives low results for organic acid, probably because of interference from the aluminum ion used in the coagulation. In the procedure described here the aluminum ion is reacted with 8-hydroxyquinoline and the total organic acid is titrated with the aid of a filter photometer using meta-cresol purple as indicator. The procedure should yield more accurate values for organic acid and may be adapted to the determination of the other gross constituents of alum-coagulated SBR using only a single weighed sample.

(2) Results obtained when E-T-A containing 5% water is used for the extraction are higher than those obtained with anhydrous E-T-A but are often considerably lower than the expected value. The water apparently produces partial hydrolysis of the aluminum soap thus facilitating the more nearly complete extraction and titration of the organic acid.

(3) Only E-T-A containing HCl (10 ml conc. acid per liter of solution) completely extracts the fatty acid from the aluminum soap *(2)*. This is evident from the fact that extraction with acidified E-T-A yields a residue with the correct refractive index. The low results for refractive index obtained with anhydrous or "wet" E-T-A again indicate incomplete extraction of aluminum soaps which lower the refractive index of SBR. Unfortunately, acidified E-T-A cannot be used for the analysis of fatty acid because the mineral acid promotes the esterification of the alcohol with the fatty acid.

(4) High values may result when the rubber is dissolved in a 5:1 toluene-ethanol solution to which nearly the maximum miscible quantity of water (about 1%) has been added. Apparently hydrolysis is complete or nearly so and complete titration of the fatty acid is possible in this rubber solution with the high values resulting perhaps from titration of the aluminum ion itself. No attempt has been made to determine to what extent the aluminum ion is titrated. However, this hypothesis of the titration of the aluminum ion is confirmed by the presence in these solutions of titratable base. Titratable base is not found in anhydrous solutions of alum-coagulated SBR.

In order to circumvent these difficulties, an attempt was made to free the organic acid for titration by combining the aluminum with 8-hydroxyquinoline. Solutions heated with this compound turned a greenish-yellow indicating the formation of the 8-hydroxyquinolate. Conductometric titration of these solutions yielded "breaks" in the conductance curve which seemed to indicate the presence of (1) a mineral acid, (2) the organic acid desired, and (3) another acid evidently the excess 8-hydroxyquinoline.

Since the "breaks" in the conductance curve which accounted for the 8-hydroxyquinoline were not sufficiently sharp for a precise analysis of the organic acid, the titration was made with the aid of an indicator. As has been shown *(7)* meta-cresol purple may be used to detect both mineral and organic acid in SBR coagulated with salt and acid. In view of the highly-colored nature of the treated solutions, the end points were detected with the aid of a Fisher Electrophotometer equipped with a suitable (green, 525-B) filter.

Materials

Four samples were used in this work: two coagulated from one SBR latex, and two from another.

(1) X-506 Coagulated with salt and acid.
(2) X-506AC Coagulated with alum from the same latex used to make X-506.
(3) X-539 Coagulated with salt and acid.
(4) X-539AC Coagulated with alum from the same latex used to make X-539.

Procedure

Take approximately 2 grams of the thinly-sheeted alum-coagulated SBR and cut it into strips or small pieces to facilitate solution. Weigh the specimen. Place a single sheet of 9-cm filter paper, perforated with small holes, on the bottom of a 400-ml rubber extraction flask containing 125 ml of toluene.

Add the weighed specimen piece by piece to the rubber extraction flask, being certain that all the pieces remain on top of the filter paper, thus preventing the rubber from sticking and burning on the bottom of the flask during heating. Dissolve the sample by refluxing in a rubber extraction apparatus. Swirl the flask if necessary to prevent the rubber from sticking to the glass.

When the sample has completely dissolved, transfer the solution to a 250-ml beaker. Add 15 ml of toluene to the extraction flask and reflux it for 3 to 5 minutes with frequent swirling of the flask. Pour the rinsing into the beaker. Rinse the extraction flask with 2 additional 15 ml portions of toluene, refluxing if necessary to remove any rubber adhering to the flask. (Note: Bubbles which persistently adhere to the surface of the glass after removal from the hot plate indicate the presence of undissolved rubber.)

Reflux and treat 125 ml of solvent in the same manner as the rubber solution to serve as a blank. For reasons explained in the discussion, solvents should be selected so that the mineral acid blank is no more than a few hundredths of a milliliter.

Add 2 ml of a toluene solution of 8-hydroxyquinoline containing 0.125 g/ml. Cover the beaker and heat at the boiling temperature for 1½ hours, being careful to keep the rubber from sticking to the bottom of the beaker by frequent stirring. Cool the solution to room temperature. Slowly add 30 ml of 95% ethanol while stirring the solution. (Caution: Do not boil the solution following the addition of ethanol.) Add 7 drops of meta-cresol purple indicator solution (0.3% solution in 95% ethanol, neutralizing each 0.1 g of indicator with 2.62 ml of 0.1 N sodium hydroxide).

Set the beaker in the photometer so that it is directly in the path of the light. Fit the photometer with a special lid which has two openings: one to permit the addition of the sodium hydroxide by means of a burette; the other to permit the entrance of a glass tube (0.5 cm inside diameter) through which a stream of inert gas is passed into the solution to expel CO_2 and to mix the solution during the titration. In placing the holes be certain that the gas lead-in tube does not fall in the path of the light.

Regulate the flow of gas by maintaining a pressure of 7-11 cm of water. Using a green filter with a maximum transmittance of 525 mμ, regulate the initial null to give the lowest possible reading on the scale representing absorbance. Titrate the solution with 0.1 N sodium hydroxide (prepared by dissolving 5.2 ml of 50% sodium hydroxide in absolute ethanol) using a 5-ml burette graduated to 0.01 ml divisions.

Make the titration in increments of 0.02 ml until no further drop in absorbance is detected, if it occurs at

all, then continue the titration in increments of 1 ml until only a few tenths of a milliliter remain to be titrated before the end point. If no initial drop in absorbance occurs for the first 0.3 ml, continue the titration in 1-ml increments as just described. In either case complete the titration in increments of 0.1 ml, taking about six points after the absorbance begins to show a steady rise.

Add 30 ml of 95% ethanol and 7 drops of the indicator to the blank and using 0.01-ml increments titrate the blank with 0.05 N alcoholic hydrochloric acid (prepared from concentrated HCl and absolute ethanol) until the period of marked increase in absorbance is past.

Plot changes in absorbance against the corresponding number of milliliters of sodium hydroxide used. If an initial drop in absorbance takes place within the first few tenths of a milliliter, a change of the color of the indicator from pink to yellow has occurred and indicates the presence of mineral acid.

In these cases make a separate plot of this portion of the curve on an increased scale to determine this end point. Draw straight or curved lines through the points preceding and following this discontinuity. Extrapolate these lines to the point of intersection A shown in Figure 1. Using this extrapolation technique determine the end point in the titration of organic acid as in Figures 1 and 2. The difference B-A shown in these figures represents the number of milliliters of reagent consumed by the organic acid.

To determine the solvent blank as a check on the quality of the solvent, plot the changes in optical density against the corresponding number of milliliters of hydrochloric acid required for the blank titration. Using the extrapolation procedure just described, the blank is represented by the difference (D-C) in Figure 3. It is not necessary to titrate a blank for the change from yellow to purple.

Calculations

$$\text{Organic Acid, per cent} = \frac{(M_B \times N_B)\ K}{W}$$

W = weight of the original dry sample.
M_B = milliliters of standard sodium hydroxide solution used to titrate the organic acid [(B-A) in Figures 1 and 2].
N_B = normality of the sodium hydroxide solution.
K = 28.4 when the organic acid is determined as stearic acid;
= 34.6 when the organic acid is determined as rosin acid.

Discussion of Procedure

Solvent: As in the test for mineral and organic acid in SBR *(7)* the sample is dissolved in toluene alone to prevent esterification of ethanol with both the mineral and organic acids. For the same reason the solution should not be boiled after addition of the ethanol.

The addition of 95% ethanol dissolves the salt of the indicator and makes possible the complete titration of the mineral acid. Only a portion of the mineral acid is titrated when anhydrous ethanol is used. Further addition of water to the limit of solubility does not increase the quantity of mineral acid titrated.

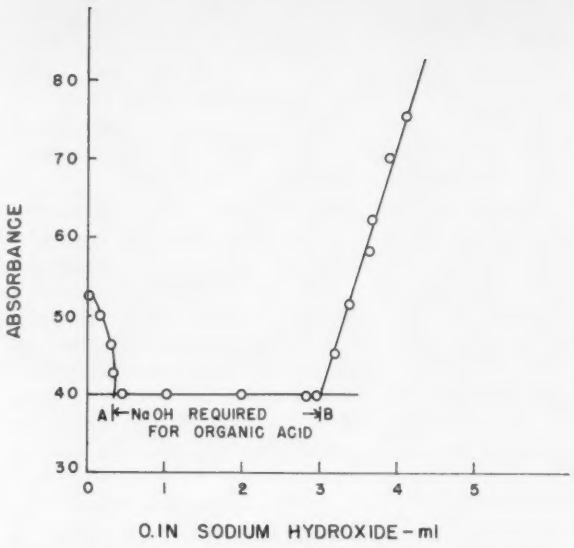

FIG. 1—Typical titration curve for SBR solutions containing mineral acid.

Quantity of Complexing Reagent: The quantity of reagent indicated has been satisfactory for the samples tested. It allows for about a 50% excess beyond that which would be required for a sample containing 1.00% ash, assuming that this entire ash is composed of aluminum oxide derived from substances in the rubber capable of reacting with the 8-hydroxyquinoline in the toluene solution. In the following discussion of the curves obtained with this titration it is shown that an excess of reagent is necessary for the determination of the end point in the manner described.

Inert Gas: Bubbling an inert gas through the solution serves not only to stir the solution during the course of the titration but also to expel CO_2.

Filter: A filter with an absorption peak at 525 millimicrons was chosen because it was the most satisfactory of several available for both end points. This judgment was based on the steepness of the absorbance curve. Preliminary study indicated that this choice might be somewhat improved, especially if separate filters were used for each end point.

Increments of Titration: Beginning the titration in increments of 0.01 to 0.02 ml makes possible the detection of small quantities of mineral acid. Continuation of this mode of titration for 0.3 ml should allow detection of the mineral acid present in the sample. The presence of larger quantities of mineral acid would be detected by a further decrease in absorbance when 1.0 ml of NaOH is added, in which case the titration might have to be repeated, extending the addition of small increments to include the end point.

Curves: In titrations of this kind a sigmoid type of curve similar to the pH curve is normally obtained.

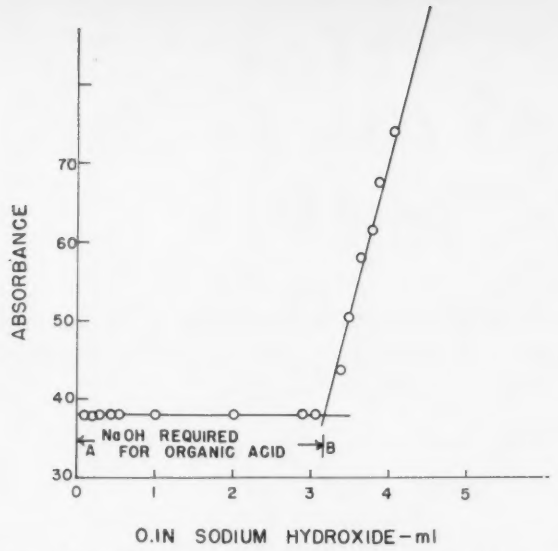

FIG. 2—Typical titration curve for SBR solutions containing no mineral acid.

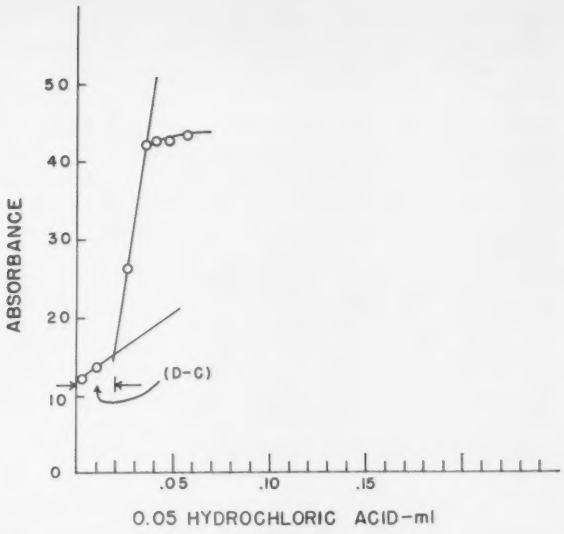

FIG. 3—A typical titration blank used as a check on the quality of the solvent.

However, in the region of the organic acid end point the optical density is approximately a straight line function of the added base at least up to the point at which the absorbance rather rapidly levels off to a constant value.

Consequently in estimating the equivalence point, this straight line relationship is extrapolated back to the constant lower value maintained over the middle course of the titration. It is believed that the excess 8-hydroxyquinoline reacts with the sodium hydroxide after all the organic acid has been titrated, and before the complete color change of the indicator has taken place.

This 8-hydroxyquinolate of sodium is colored. However, while the formation of the compound itself tends to increase the absorbance of the solution, the addition of the indicator increases this rate of change without impairing the straight line relationship. Though the absorbance curve for the mineral acid end point is probably a typical sigmoid type of curve, the extrapolation technique has also been applied to this curve as a matter of convenience. This procedure should be satisfactory as long as the blank is determined in the same manner.

Blanks: Only the mineral acid blank (first end point) need be titrated, and for the purpose of calculating organic acid even this blank is essentially insignificant when it is, as is usually the case, 0.01 ml or less. Batches of solvent for which the mineral acid blank is appreciably greater than 0.01 ml should not be used since the alkaline material producing the blank will interfere to an unknown extent in the titration of samples containing either little or no mineral acid (Figure 2).

In order to determine the need for correcting for an organic acid blank (second end point), tests were made using 2 g of X-506 with and without added 8-hydroxyquinoline. The data obtained are given in Table I. It is apparent that a blank correction is unnecessary when the titration is made in the presence of 8-hydroxyquinoline and the end point determined in the manner described. Indeed, these results are reasonable in view of the fact that the reaction product of the 8-hydroxyquinoline with NaOH contributes to the increase in absorbance following titration of the organic acid.

No study was made to determine whether the time and temperature of the reaction could be reduced.

It would, of course, be possible to devise a scheme of analysis for the gross chemical constituents of alum-coagulated SBR similar to that used for SBR containing soap *(6)*. For example, the stabilizer could be determined on a 3-ml aliquot of the original toluene solution of, let us say, a 5-g sample dissolved in 250 ml of solvent, and diluted with methylcyclohexane as the spectroscopic solvent.

Organic acid could be determined on a 100 ml aliquot of the same solution diluted to 170 ml with toluene. Soluble soap, if present, could be determined on the 147-ml aliquot remaining after the organic acid and stabilizer aliquots were taken. Dilution with 100 ml of a mixture of 60 parts by volume

TABLE I—TITRATION OF SBR WITH AND WITHOUT ADDED 8-HYDROXYQUINOLINE

Titration of 2 g specimens of X-506 with 0.1174N NaOH

	W Without 8-hydroxy-quinoline ml	X Blank for (W) ml	Y W — X ml	Z With 8-hydroxy-quinoline ml
	3.19	0.084	3.106	3.04
	3.17	.084	3.086	3.10
	3.18	—	3.096	3.04
	3.12	—	3.036	3.06
Mean	3.165	0.084	3.081	3.06

of toluene and 40 parts absolute ethanol should give a satisfactory titrating medium *(6)*.

Bound styrene could be determined by measurement of the refractive index of polymer purified in the manner described for SBR containing soap *(6)*. In this case the extraction would have to be made with acidified ethanol-toluene azeotrope *(2)* for a sufficient length of time to insure complete removal of the residual aluminum soap. The method of measurement is described in the ASTM methods of analysis for SBR *(1)*.

Results

The precision of this test was estimated statistically by a method described elsewhere *(4)*. Typical data are presented in Table II. Except for the erratic value omitted from the calculations, the precision of the test is comparable to that of the fatty acid test used in the analysis of SBR containing soap *(6)*. In another series of thirteen determinations made by another operator on five different samples there occurred one other erratic value also obtained on a specimen of X-506AC. Until it is possible to establish the reason for erratic values, it is suggested that analyses be made in triplicate so that any erratic values that occur may be more easily detected.

The values given for X-506 and X-539 coagulated from the same latex with salt and acid include the equivalent of the fatty acid present as soap in these samples. These values were determined by methods of established accuracy *(4, 6)*. In the case of the new method agreement with these values is much better than in the case of the E-T-A extraction procedure, at least for sample X-539AC. Since these two sets of samples were prepared at different plants employing different finishing processes, it is possible that the difference in total organic acid content between X-506 and X-506AC is real.

Error Determination

Using a modification of a previously described procedure *(4)* a study was made of the errors in the mineral acid titration and their effect on the determination of organic acid. The data were obtained by titrating different known quantities of mineral acid added to solutions of X-506AC and 539AC. These data showed a negative relative error, i.e., an error proportional to the quantity of mineral acid titrated, which may be of the order of 10 per cent. There was no detectable constant type of error. In the visual titration of mineral acid in SBR a negative relative-type error of about 6.5 per cent was observed. The presence of added mineral acid in samples X-506AC and X-539AC raises somewhat the values obtained for organic acid.

These higher values are consistent with the presence of a negative relative error in the mineral acid titration. Such an error indicates that a part of this constituent is not titrated at the first end point, but rather at the second end point, thus increasing the values obtained for organic acid. The precision of the data was insufficient to detect a trend in values with increasing quantities of added mineral acid.

After treatment with 8-hydroxyquinoline some alum-coagulated samples show a mineral acid content equivalent to as much as 0.3 ml of O.1N NaOH. This quantity is not sufficient to raise the organic acid value by more than about 0.05%.

TABLE II—TOTAL ORGANIC ACID IN ALUM-COAGULATED SBR

Day	Organic acid content X-506AC	Organic acid content X-539AC
	%	%
1	5.38	5.12
	5.39	4.96
2	5.35	4.94
	5.38	4.94
3	5.36	4.97
	5.39	5.05
4	5.41	4.94
	5.44	4.97
5	5.38	4.89
	5.11[a]	4.86
Mean	5.39	4.96
S_t[b]	0.019	0.058
S_d[c]	0.016	0.049
S_r[d]	0.024	0.076

Total organic acid in sample coagulated from same latex with salt and acid: 5.15(X-506) 5.00(X-539)

Value obtained by "wet" E-T-A extraction of the alum-coagulated sample: 4.85 4.15

[a] This value is probably erratic and was therefore omitted from the calculation of the mean and the components of variability.
[c] S_d is the standard deviation corresponding to day-to-day variability.
[b] S_t is the standard deviation corresponding to intrinsic variability.
[d] S_r is the standard deviation of a single random determination.

ACKNOWLEDGEMENT

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Small Business Problems Ahead

Senator John J. Sparkman (D., Ala.), Chairman of the U. S. Senate Committee on Small Business, answers a series of questions on the 1962 small business outlook

By LARSTON D. FARRAR
Washington 4, D. C.

Senator Sparkman

► *First, Senator Sparkman, I want to thank you, on behalf of the readers of* RUBBER AGE, *for taking your time from a busy Senate schedule to answer questions which are on the minds of many small businessmen in all areas of the nation. It is most gracious and kind of you to help in this manner.*

Senator Sparkman: I'm happy to do it, Larston, for I sincerely believe that the small businessmen of the United States already play a vital role in their local, state and Federal Governments, and that, with good information, they will be able to play an even more vital role in the future. These are troubleous times—particularly in the international field—and it behooves all of us in positions of responsibility to strive to help small businessmen understand clearly as many phases and facets of our domestic problems as possible. A strong, small business community is the backbone of our nation's economic strength.

Speaking of that, Senator, I was told the other day that there now are more small businessmen in the country than there are farmers. There actually now are some 4.5 million small businessmen, and, as we know, man embraces woman, in this case, as is usual.

SPECIAL INDUSTRY REPORT

Senator Sparkman: That is quite true —about the number of small businessmen! We on the Senate Committee on Small Business are well aware of the vitality of the small businesses of the United States. But we are convinced that we all have our work cut out for us in solving some of the problems facing our small businessmen.

Senator Sparkman, just how would you rank the principal problems facing the nation's small businessmen—as contrasted to the 100 biggest businesses—in the months ahead?

Senator Sparkman: The chief general problem confronting the nation's small businessmen will be to remain competitive with their larger and more powerful rivals. Competition today is not merely keen; it is often savage. Unless small firms find means of strengthening their position in relation to the giant corporations of our economy, before long they may be in danger of passing out of the picture as significant factors in the marketplace.

Part and parcel of this general problem is the question of the burden of income taxes on smaller companies. Unquestionably, the burden of taxes falls more heavily on small concerns than on big companies. One crippling effect of this drain on the financial resources of small firms is that they are unable to generate internally — from earnings — funds for modernization, growth and expansion. This is a serious drawback because with our economy expanding as rapidly as it is, to remain stationary is to invite obsolescence with all of its attendant disadvantages.

Close in importance to some form of tax relief is the problem of guarding small and vulnerable concerns from unfair competitive practices and antitrust violations in general. Mergers that injure competition and tend to promote monopoly are especially harmful to independent merchants and producers. In addition, ways must be found to increase the small business share of Government contracts, the vast bulk of which are being awarded to a relatively few large corporations and their subsidiaries. The small business potential as suppliers to the Federal Government, both in the military and civilian fields, is far from realized.

Not to be overlooked is the necessity for the average small businessman to increase his management skills. He is daily having to match wits with competitors having highly specialized staffs. Small businessmen must become better versed in the techniques of modern management.

Do you feel that the President's recommendations on expense accounts will be enacted into law by Congress? Many businessmen — big and little — seem to believe that the proposals — such as limiting a businessman to spending $30 a day on business trips— are utterly unrealistic.

Senator Sparkman: It is probable that some curb on excessive expense account deductions will be enacted. What constitutes a fair daily expense allowance for businessmen will have to be determined by the Congressional committees studying this problem.

Because you seem to hold out some hope for tax relief for businessmen, eventually if not in the next several months, I wonder if you would discuss the chances of excise tax reduction, or abolition, on such items as telephone bills, and the others which seem to be quite steep.

Senator Sparkman: Except in a few cases where it can be demonstrated beyond a doubt that excise taxes are an indefensible burden on a business or service, I do not believe that curtail-

ment of this source of revenue will be achieved in the near future. In fact, tax cuts in general, at least for the present, do not seem to be practicable. The possibility of a reduction in expenditures for defense is remote for one thing. And we cannot keep abreast of the Russians in missilery and space exploration for pennies. It is estimated, for instance, that the cost of putting a man on the moon will approximate $40 billion.

What is your thought about the administration's proposals on postal rate hikes? A number of small businessmen, who use direct mail advertising, feel that these proposals will be detrimental to them.

Senator Sparkman: Unquestionably something should be done to reduce our huge annual Post Office Department deficits. I feel that the burden of any increase in postal rates should not fall on any single class of users, but should be shared on some basis by all users of our postal service.

Senator, as I recall, under the previous administration you seemed quite dissatisfied with the manner in which the U. S. Small Business Administration was being administered. I wonder if you have any comments on the manner in which the agency is working these days under the direction of John E. Horne?

Senator Sparkman: In the few months since John E. Horne, my former Administrative Assistant, has been Administrator of the Small Business Administration, I have observed a definite quickening of the tempo of that agency. SBA program direction has been infused with new vigor. Already steps have been taken to speed up the mechanics of making loans to small firms, while the interest rates on loans to small firms and local and State development companies in distressed labor areas have been reduced from 5.5 to four per cent. The agency's regional offices have been given greater authority to make loans on their own initiative. One result of this activity is that the number of SBA loans to small businesses increased 35 per cent in April and the value of the loans went up 62 per cent over April of a year ago. SBA also seems to have had more success recently in channeling defense contracts to small firms.

As chairman of the Senate Committee on Small Business, are you satisfied with the statements Secretary of Defense Robert S. McNamara has made relative to the contracts policy his agency will follow?

Senator Sparkman: All members of the Senate Small Business Committee have been encouraged by the attitude toward small business suppliers evidenced by Secretary of Defense McNamara. Mr. McNamara has left no doubt in the minds of committee members that he intends to follow to the letter President Kennedy's instruction that military procurement officials take whatever steps are necessary to increase the share of small firms in defense contracts by 10 per cent. The Defense Secretary's knowledge of the capabilities of small business was shown when he testified before our Committee that: "I am well aware of the advantages which a competent small business can offer its customers. A good, small firm can provide flexible and responsive engineering, low administrative costs, and first-rate products."

If the 10 per cent goal is reached, it will be worth $344 million in additional defense business to small firms in the coming fiscal year.

Do you feel that small business can play a more vital role in assuaging the unemployment problem?

Senator Sparkman: Look at it this way: to reduce unemployment to four per cent of the work force by mid-1962, we will have to create between four and five million new jobs. Only business can do this. Now, if on the average the nation's 4.5 million small businesses could add just one worker, the result would be 4.5 million new jobs —enough to fill the gap.

Do you believe that small business problems get as much attention in the public media—the newspapers and over radio and television programs—as these problems deserve?

Senator Sparkman: I do not. Generally speaking, the nation's mass communications media—newspapers, periodicals, radio and television—tend to underplay news pertaining to the problems of small and independent enterprises. These major channels of communications do not yet seem to realize that when we speak of small business in the aggregate, and not just a single corner retail shop, we are in effect calling attention to weaknesses in the structure of our entire free enterprise system. You cannot blink at the fact that small firms comprise more than 95 per cent of our business population.

Are you aware of the Small Business Administration survey which shows that no more than 10 per cent of the small businessmen in the nation have even heard *of the agency's management training program, which is carried on in connection with principal educational institutions, much less are familiar with* all *of the agency's other programs?*

Senator Sparkman: Our committee constantly has stressed the necessity of full publicizing of the Small Business Administration's program. At the same time, however, SBA has been in existence since 1953 and it must be an unusually uninformed small businessman who, being in need of help, is not by now aware that there is a Government agency available to counsel with him and render various forms of assistance. While many businessmen may not know in detail of various SBA programs, I suspect that the percentage of those believed not to know of the agency's existence is probably overstated.

It has been said that the Kennedy Administration is "the small businessman's administration," as contrasted to "the businessman's administration" of President Eisenhower. What do you think of these characterizations?

Senator Sparkman: I think they are accurate.

Is it your feeling that small business has been gaining, or losing, ground in the United States during the past eight years? If you feel that small business has lost ground in the past, do you feel that the legislative program of the new administration will develop a more favorable climate for small business to flourish?

Senator Sparkman: In relation to the huge strides made by very large corporations, small business has lost ground. The failure rate of small business is the highest in more than 25 years. Judging from the recent increase in loan applications made to the SBA, it must be increasingly difficult for small firms to obtain credit from normal private sources of credit. Between 1951 and 1960, stockholders' equity in small manufacturing companies declined; such equity in larger manufacturing concerns increased in that time by 75 per cent. From 1959 to 1960, the sales of smaller producing plants decreased while the sales of larger manufacturing corporations increased.

I believe that the present Administration's legislative program for small business, if adopted, will make it possible for smaller companies to regain some of the ground they lost in the 1953-1960 period.

Retailing represents, numerically, the greatest segment of our small business community. Do you feel that retailing will make significant sales gains during the remainder of this year, as a result of policies now being pushed by the White House?

Senator Sparkman: Much depends on the rate of general business activity with an increase in payrolls and consequently larger amounts of disposable income held by consumers. To the extent that President Kennedy's anti-recession program is successful, I feel that there is a good possibility that retail sales will pick up between now and the end of the year.

EDITORIAL

Season's Greetings

For all molders and extruders
For all coaters and denuders

For each and every masterbatcher
For each proofer, color matcher

For every rubber pulverizer
For each and every vulcanizer

For those who work with mats or slippers
For engineers and latex dippers

For carbon black men, lab technicians
For tensile testers—electricians

For deflashers, packers, grinders
For vinyl foamers, wire winders

For rackers, stackers, cement mixers
For slitters, slicers, repairers, fixers

For each of you—in every way—
A Merry, Merry Holiday!

RMA Holds 46th Annual Meeting on November 16th in New York City

► Approximately 200 members of the Rubber Manufacturers Association were in attendance at the 46th Annual Meeting held on November 16 at the Essex House in New York City. The meeting was presided over by Ross R. Ormsby, president of the Association. Featured speakers included Dr. R. T. "Ted" Compton, Vice-President for Government Relations of the National Association of Manufacturers; Thomas G. MacGowan, Director of Advance Planning for the Firestone Tire & Rubber Co., and Dr. Gabriel Hauge, Vice-Chairman of the Board of the Manufacturers Hanover Trust Co. of New York.

Dr. Compton addressed himself to the subject: "The 87th Congress at the Halfway Mark." For his part in the proceedings, Mr. MacGowan spoke on "Opportunity and Challenge in the Rubber Industry." Dr. Hauge, the after luncheon speaker, chose as his topic, "Our Economic System and the National Character."

Six Directors Re-elected

At the business portion of the meeting, six rubber industry executives were re-elected to serve three year terms on the Board of Directors of the organization: A. L. Freedlander, chairman of the board, Dayco Corp., Dayton, Ohio; T. W. Miller, Jr., president, Faultless Rubber Co., Ashland, Ohio; M. G. O'Neil, president, General Tire & Rubber Co., Akron, Ohio; F. B. Williamson, III, president, Goodall Rubber Co., Trenton, N.J.; J. W. Keener, president, B. F. Goodrich Co., Akron, Ohio; and Russell DeYoung, president, Goodyear Tire & Rubber Co., Akron, Ohio.

Mr. Ormsby predicted that new rubber consumption would rise more than 7½ per cent over present levels in 1962. The estimates are that the industry will use 1,615,000 long tons next year, a figure second only to the record 1,628,000 long tons consumed in 1959. Mr. Ormsby said synthetic rubber would account for more than 73 per cent of the total new rubber used next year.

Pointing out that the development and use of synthetic rubber has given the industry a degree of supply and cost stability never experienced in the past, Mr. Ormsby drew special attention to the increasing use of the new stereospecific rubbers. He pointed out that four plants are now in commercial production and that a fifth would come on stream within a few days.

Ross R. Ormsby

Mr. Ormsby took note of improved stability in labor-management relations in 1961, observing that: "This year many of our companies have combined wages and contract issues in a single set of negotiations, with these matters settled for a longer period of time than previously was the case. Also", he said, "this year the Union has for the first time given recognition to a wage differential between tire and non-tire products. This, we believe to be most constructive and again adds stability to our operations, providing the rubber industry with an opportunity to do a better job of forward planning."

Legislative Interests

In reviewing the legislative interests of the industry, Mr. Ormsby cited appearances and statements filed by the association on highway financing, impact of imports on employment in the rubber footwear industry, taxation and the government research patent bill. Mr. Ormsby said that while there are occasions like these where it is appropriate for a trade association to express an industry view, it is proper and more effective for individuals "in our industry to express their own views on legislation and we strongly urge that more of this be done."

In his address, Dr. Compton stated that greater sentiment for more economy in Washington is expected to manifest itself in the second session of the 87th Congress. Dr. Compton expressed the view that more cau-

tious attitudes could be expected to prevail in the next session of Congress with respect to rising costs of government and that there would be widening opposition in the House to financing the Government programs by borrowing through the process known as "back door" financing, as contrasted with normal appropriation procedures.

He said that in an election year when every member of the House must make an accounting to his constituents, members of that body may be giving more weight to opinions back home and less to Congressional leadership. For that reason, Dr. Compton said, "We seem to be coming into a time when the outcome of the major issues may depend just a little less on the attitude of Congressional leadership and a little more on the opinions that you and others express to your Congressman about these issues."

Steady Postwar Growth

In his remarks, Mr. MacGowan noted that the steady postwar growth of the rubber industry will continue at an even faster rate through 1975 as companies diversify production toward non-rubber products and rubber products other than tires. Since 1946, the industry has been growing along with the total economy in a healthy, if not spectacular fashion, he said. Although it is not usually ranked among the industrial groups thought to have the best growth possibilities, the rubber industry has nevertheless nearly doubled its sales since the war, Mr. MacGowan said.

Just how good is the future of the rubber industry likely to be? Depending on the degree of creative and innovational power shown by the industry, Mr. MacGowan looks for a sales increase of between 130 and 156 per cent by 1975. Such rates of growth would be far greater than those expected for the American economy as a whole or for the country's manufacturing industry in general.

"The tire and tube business will, as it has always been, continue to be a very good one," Mr. MacGowan said. Encouraging trends for the future are the increasing number of automobiles in relation to the population, the popularity of snow and other special purpose tires, and increased use of the automobile with more leisure time available.

Dr. R. T. Compton

Non-Rubber Products

But the encouraging fact, Mr. MacGowan said, is that 23.2 per cent of the industry's sales in 1960 were in the rapidly enlarging field of non-rubber products, an area in which its growth rate has far outstripped the country's over all growth in manufactured goods. The non-rubber areas of the industry include chemicals, plastics, fibers, metal products, defense items and numerous miscellaneous lines.

The rubber industry's development and marketing of new lines and new products within old lines is "one of the hallmarks of industrial growth that is more rapid than the average for manufacturing industry in general," the speaker said.

Diversification

Many of the industry's best possibilities in the diversification line stem from the use of entirely new materials which will basically change the character of the product and widen its field of application, he added.

Entirely new polymers, including numerous rubber-plastic blends, have a great future, according to the Firestone executive. "An industry which can build into the polymers it uses any desired combination of strength, weather resistance, heat and cold resistance, oil resistance, hardness and softness is in an excellent position to withstand competitive attack from substitute materials and to move into fields now dominated by other materials."

He also listed rubbers of the polybutadiene, polyisoprene, ethylene-propylene, nitrile, acrylic and Hypalon types as important materials

T. C. McGowan

which can potentially change the character of the industry.

Although transportation will continue to be the industry's greatest field, Mr. MacGowan looks for accelerated moves into other areas with "a splendid period of growth and development in any case" and "a spectacular one" if the industry's opportunities are fully seized.

An Untapped Market

The building and construction industry offers perhaps the greatest untapped market for the rubber industry, he said. "There are many improvements that can be made in building materials and many ways in which the rubber industry can and will be involved profitably and usefully in these changes," he said.

Maritime products, the aircraft industry, wearing apparel, the leisure activities market, adhesives and components for machinery all offer splendid future growth possibilities for the rubber industry, he said.

Mr. MacGowan pointed out that even without further diversification the sales of rubber industry as a whole to automotive producers amount to only about one-sixth of its total volume. He contrasted this situation with the greater element of dependence on automotive industry purchases found in various other industries.

Mr. MacGowan also cited rubber industry's trend toward increase in manufacturing plants abroad as a key to diversified growth. "There seems little doubt that the rubber industry has gone farther in this matter of foreign plants than has almost any other, and the number of such plants is continuing to increase," he said.

At the same time, the value of

tires being exported from the United States is still more than four times as large as the value of imported tires. The ratio of exports to imports in the case of the American tire industry, Mr. MacGowan said, is one of the highest for any industrial group.

Following lunch, Dr. Hauge spoke and declared that our economic and political institutions are the living frame-work of national character. What we are governs in good measure what we can do. What we do, on the other hand, helps determine the kind of people we and our descendants shall become.

A future-oriented society such as ours must grow or wither. It has grown because men were willing to take risks, were proud of a job done well, and were stimulated by a system which rewarded individuals largely on their performance. Growth, and character, are threatened by excessive concern for security and fear of failure, by emphasis on leisure to the detriment of productive work, and by a distribution of income weighted too heavily toward status, need, or power rather than contribution, he stated.

A past of developing a new continent placed a premium on competence and efficiency; these, however, conflict with the principle of equality, which also is steeped in our history. Our economic system is the design for efficiency and economic equity; our political system is the engine of equality. How we utilize each to complement and not obstruct the other will critically influence our strength at home and our posture in the world, the speaker said.

"For, indeed, we live in perilous

Dr. Gabriel Hauge

times, as brave men always have. Present tensions are not a passing emergency but part of a prolonged struggle. We cannot meet our tests by resort to temporary expedients. The methods we use, the objectives we seek, we will have to live with indefinitely. They should, with exceptions made only on the clearest showing of necessity, be in keeping with our national character and the institutions our people have created."

Dr. Hauge observed that wartime controls in the long twilight of the Cold War can generate a barracks mentality and weaken our free system. "The test we face is severe, but let us take care to frame our policies in harmony with our character at its best, not at its worst; to play to our strengths, not to our weaknesses. If we conduct ourselves in that spirit, some later historian can say in truth that we were grandfathers as well as grandsons of great men," he concluded.

SBR Exports to USSR Queried by Keating

► The export of 3,800 tons of butadiene-styrene synthetic rubber to the Soviet Union was questioned recently by Senator Kenneth Keating (R.-N.Y.) at hearings before the Senate International Security Subcommitee on United States policy on exports to Soviet Bloc nations. A spokesman for the Department of Commerce told the subcommittee that the export license was approved because this type of general-purpose synthetic rubber has no particular military use, and the USSR has sufficient synthetic rubber capacity to take care of its own military needs. Denial of the export license, the Commerce Department spokesman added, would have put an American firm at a competitive disadvantage, since SBR is readily available to the Soviet Union from European plants.

In voicing his objections to this type of export license, Senator Keating pointed out that shipments of civilian items, such as this synthetic rubber consignment, release capital and labor in the Soviet Union that can be used for military purposes. The Senator suggested that it might be a good idea to ban shipments of this nature, and persuade our European allies to do the same.

Rasmussen Retires

► Harry Rasmussen has retired from Scott Testers, Inc., Providence, R. I., after 18 years as manager of the company's Mooney Division. Mr. Rasmussen became associated with the late David Scott in 1943 when the former Henry L. Scott Co. took over the manufacture and distribution of the Mooney Viscometer at the request of the wartime Office of the Rubber Director. He has long been active in rubber industry affairs. Organizations of which he is a member include Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing and Materials, the Rubber Division of the American Chemical Society, and the Boston, New York, and Rhode Island Rubber Groups. He is also a member of the Chemists' Club, New York, N. Y.

► Dumont Corp., San Rafael, Calif., has been purchased by H. J. Thompson Fiberglass Co., Los Angeles. A. F. Reznicek of Dumont will move his headquarters to Los Angeles.

Producing New Diene

► Firestone Synthetic Rubber & Latex Co., is producing an improved Diene polybutadiene synthetic rubber at its Petrochemical Center in Orange, Texas. According to the company, Diene now exhibits a very greatly reduced cold-flow tendency which makes handling, shipping, and storage comparable to SBR rubbers. Actual road tests show improved performance, and other tests show better physical properties in other products than with the original Diene. In addition, factory processing data indicate equal or better results in mixing, milling, and extruding. The new improved Diene is being produced at two Mooney levels, 35 and 55.

Budene Snow Tire

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the marketing of a new snow tire manufactured with Budene and conventional synthetic rubbers. This blend gives the tire up to 16 per cent more traction on ice and seven per cent more on snow, according to Goodyear. Because Budene (polybutadiene) compounds are relatively insensitive to temperature change, the tire also does not stiffen and become hard when the thermometer plunges. This, plus the extreme flexibility of the new rubber makes for a tread that clings to slippery surfaces far better than those with ordinary winter compounds, Goodyear states.

Six Cable Companies Cited for Bid Rigging

► Six large manufacturers of power cable have been charged with anti-trust violations by New York State. The firms were accused of having submitted identical bids for paper lead cable to the New York City Transit Authority. The summons and complaint were served on October 27 to the six companies. They are Anaconda Wire & Cable Co., General Cable Corp., Phelps Dodge Copper Products Corp., Okonite Co., United States Steel Corp., and the Colorado Fuel & Iron Corp.

The companies are charged with having received some $1,080,000 in contracts from the Transit Authority during the past six years as a result of the alleged identical bidding. According to the complaint, a tabulation of the bidding shows that out of 107 contracts during the six-year period, all the bids from the six power cable firms were either identical or similar, with the exception of one contract about five and a half years ago.

The New York State Attorney General has asked for a permanent injunction to restrain the companies from continuing the alleged illegal practices in restraint of trade, and also requested that penalties of $50,000 be imposed on each defendant. These civil penalties were added to the statutes this year on the recommendation of the Attorney General, Louis J. Lefkowitz.

Spokesmen for the six cable firms said that the charges were groundless and would be fought vigorously. The firms were given 20 days to answer the complaint. No date has yet been set for trial in the New York State Supreme Court.

Fish Awarded Contract

► Fish International Corp., an affiliate of Fish Companies, Houston, Texas, has been awarded a $70 million contract to engineer and construct a petrochemical complex near San Lorenzo, Argentina. Fish was chosen by Petroquimica Argentina, S.A., an Argentine company jointly-owned by Fish International, Cities Service Co., Continental Oil Co., U.S. Rubber Co., and Witco Chemical Co. Planned capacity of the plant is 32,000 tons of butadiene and 14,000 tons of styrene annually, for the manufacture of synthetic rubber and sales to plastics manufacturers outside the complex.

Develops Silastic Foam

► A low density silicone rubber foam that vulcanizes at room temperature has been developed by Dow Corning Corp., Midland, Mich. Identified as Silastic RTV S-5370, the compound is supplied as a low viscosity fluid. Addition of a catalyst produces the foam. When the foam is allowed to expand, it produces a cell structure 10 per cent closed with a density of 10 pounds per cubic foot. These silicone rubber foams are serviceable from —70° to 500° F., and have good electrical properties. Expected applications for the new foam rubber include thermal and vibration insulations, cushioning and sealing. Because the catalyzed fluid pours easily before the foaming reaction is complete, it can be substituted for fabricated sponge in applications in which it is difficult to install the fabricated sponge.

Rear Tractor Tire Offered

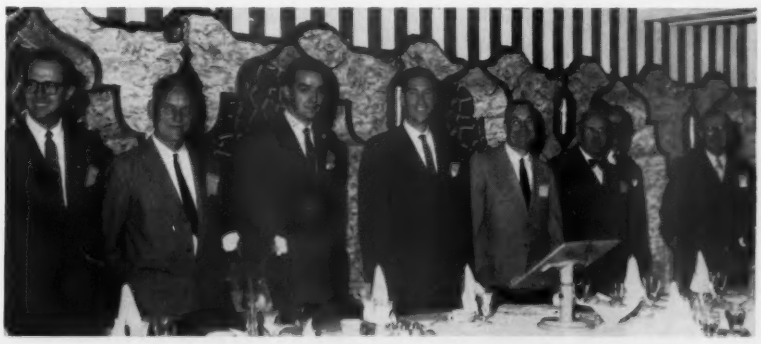
► A rear tractor tire, designed for agricultural-type tractors used in industrial-type operations, is being marketed by B. F. Goodrich Tire Co., Akron, Ohio. Called the B. F. Goodrich Power Industrial Rear Tractor tire, it has wider, more massive cleats than the conventional farm tractor tire while retaining the conventional tire's self-cleaning tread design. This gives the tires superior wear when used on hard surfaces and ample traction in soft dirt, according to Goodrich engineers. It is especially recommended for tractors equipped with mounted equipment such as back hoes and trenchers.

Quebec Hears Macht On Polybutadiene

► "*Cis*-1,4 Polybutadiene, Its Properties and Applications" was the subject of a talk given by John Macht (Polymer Corp.) at a technical meeting held by the Quebec Rubber & Plastics Group on October 19, at Ruby Foo's Restaurant, Montreal, Canada. The dinner meeting marked the 20th anniversary of the Quebec Group, and was attended by 80 members and six past chairmen.

In his presentation, Mr. Macht examined the processability, physical properties, and possible mechanical goods applications of the polybutadiene elastomer. According to the speaker, some of the properties of *cis*-1,4 polybutadiene are: satisfactory processing behavior; low gum tensile strength requiring reinforcing fillers to attain optimum strength; better resilience than natural rubber over a wide range of temperatures; water resistance superior to nitrile rubber; a tendency to crystallize like natural rubber at low temperatures; its aging behavior is intermediate between natural rubber and butadiene-styrene synthetic rubber; ozone resistance characteristics of highly unsaturated polymers for which protection can be achieved with antiozonants; electrical properties equivalent to low ash grades of cold SBR; and very high permeability to inert gases.

Mr. Macht informed the group that in the suitable or probable uses of *cis*-1,4 polybutadiene, the following products are to be considered: solid tires, floor tiles, golf balls, wire and cable, sponge, and V-belts.



The head table at the 20th anniversary dinner meeting of the Quebec Rubber & Plastics Group. Left to right: *Past Chairman*, J. L. MacDonald (C.I.L.); *Past Chairman*, W. R. Blundell (Dominion Rubber); *Guest Speaker*, John Macht (Polymer Corp.); *Present Chairman*, E. May (Naugatuck Chemicals); *Past Chairman*, R. P. Bales (British Rubber); *Past Chairman*, E. D. Bent (Northern Electric); *Past Chairman*, E. Nicholls (Goodyear Canada); and *Past Chairman*, M. F. Anderson (Dominion Rubber), who was the first chairman of the Quebec Group.

Harries Installed in Rubber Hall of Fame

► Carl Dietrich Harries, a German chemist who provided the first well-defined picture of the structure of rubber hydrocarbons, was installed as the eighth member of the University of Akron's International Rubber Science Hall of Fame. The installation ceremony took place at the Fourth Annual Rubber Science Hall of Fame Banquet on November 17 at the University of Akron. J. E. Trainer, executive vice-president of the Firestone Tire & Rubber Co., was the featured speaker at the dinner, discussing "The Rubber Industry Today and in the Future."

Second German Named

Prof. Harries, who was born in 1866 and died in 1923, is the second German national to be admitted to the Rubber Science Hall of Fame. He follows Carl O. Weber (1860-1905), who was the first person to carry out a scientific study of the vulcanization and chemistry of rubber.

A graduate of the University of Berlin, Prof. Harries is also noted for his contributions to the early development of synthetic rubber. He served on the faculty of the University of Kiel as a professor of chemistry, and in 1920 was elected president of the German Chemical Society.

Trainer Gives Address

In his after-dinner remarks, Mr. Trainer cited the development of synthetic rubber as the industry's greatest accomplishment in the past two decades. "Imagine the critical supply and price situation," he declared, "which the whole world would face if it relied on natural rubber alone to supply its ever increasing demands.

"What makes it more important," the rubber company executive added, "it came at a time when the need was most urgent. The Allies could not have won World War II if the synthetic rubber program had failed. I know of no other industry which has more successfully achieved such a revolution in materials and processing technology," continued Mr. Trainer.

He pointed to diversification of the rubber industry through polymer chemistry which has led to two related fields of growth—new rubbers and new plastics. "Today's research promises that we will have in the rubber industry an ever increasing array of materials, and a versatility never known before," Mr. Trainer emphasized. Looking to the future, with the natural growth curve continuing at its present pace, Mr. Trainer foresees a 100 per cent growth in the rubber industry by 1975.

Other Members

Other members of the International Rubber Science Hall of Fame are: Henri Bouasse (French, 1866-1953); Charles Goodyear (American, 1800-1860); Ivan I. Ostromislensky (Russian, 1880-1939); Carl O. Weber (German, 1860-1905); and C. Greville Williams (English, 1829-1910), all elected in 1958 when the Hall of Fame was initiated. Thomas Hancock (English, 1786-1865) was installed in 1959, and Henry Nicholas Ridley (English, 1855-1956) was installed at the 1960 banquet.

The 1961-1962 officers of the Washington Rubber Group, and the guest speaker at the Group's October 26 annual banquet. Left to right: *Treasurer*, George A. Smith (National Security Agency); *Secretary*, George T. Wingate (Goodyear); Congressman William H. Ayers of Akron, Ohio, speaker; and *President*, Thomas A. Tharp (General Tire). Not in photograph: *Vice-President*, Daniel Pratt (Bureau of Ships).

Washington Installs New Officers

► The Washington Rubber Group installed its 1961-1962 officers at an annual banquet on October 26 at the Army & Navy Town Club, Washington, D. C. Guest speaker at the dinner was the Honorable William H. Ayres, Congressman from 14th Ohio District, which includes Akron.

The 1961-1962 Washington Rubber Group officers are: *President*, Thomas A. Tharp (General Tire); *Vice-President*, Daniel Pratt (Bureau of Ships); *Secretary*, George T. Wingate (Goodyear); and *Treasurer*, George A. Smith (National Security Agency).

Develops Cable Insulation

► A new series of cellular, irradiated polyolefin insulating materials for coaxial cable has been dveloped by Radiation Materials Inc., Long Island City, N. Y. Designated Electrocel, the new dielectrics are designed to impart to coaxial cable a combination of superior heat resistance and toughness with low capacitance and reduced attenuation. They are said to be especially suited to applications where space and weight savings, without loss of dielectric efficiency, are of major importance. The materials are available as insulation in coaxial cable with either Electroset S/E (irradiated polyolefin jacketing) or standard PVC jacketing.

► Textile Machine Works, Reading, Penna., has moved the packaging machinery operations of J. L. Ferguson Co., which it recently procured, from Joliet, Ill., to Reading, Penna.

David E. Jones

Retires from Amerace

► David E. Jones, manager of technical research for the American Hard Rubber Co. Division of the Amerace Corp., Butler, N.J., retired on December 1 after 42 years of service. Mr. Jones graduated from Colgate University in 1917 with a B.S. degree, and shortly after enlisted in the U.S. Army. He attended the Army Ordnance Technical School and studied the chemistry and technology of explosives. Prior to joining the American Hard Rubber Co. in 1919 as a chemist, he served briefly with the Army Ordnance Corps as a civilian employee. In his association with American Hard Rubber, Mr. Jones advanced to the position of chief chemist, and later became manager of chemical research. In 1957, when the firm became a division of Amerace, he was named manager of technical research. During World War II, Mr. Jones served as chairman of the Hard Rubber Consulting Technical Committee of the War Production Board.

Mr. Jones is a member of the Division of Rubber Chemistry of the American Chemical Society, having served as a director of the division; the New York Rubber Group, serving as chairman during 1950; and the American Society for Testing and Materials, being one of the ten original members of Committee D-11's Subcommittee 23 on Hard Rubber.

Texus Completes Unit

► Construction has been completed on a new *cis*-polybutadiene pilot plant of the Texas-U.S. Chemical Co., located at Port Neches, Texas. According to the company, the pilot plant incorporates a new process it developed to produce the *cis*-polybutadiene synthetic rubber.

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Butyl Symposium Held At AIEE Fall Meeting

► Seven papers dealing with butyl rubber wire and cable insulations were presented on October 20 during the Fall General Meeting of the American Institute of Electrical Engineers, held on October 15 to 20 at the Statler Hilton Hotel in Detroit, Mich. E. J. Merrell (Phelps Dodge Copper Products) served as chairman of the symposium.

The first paper was "Electrical Characteristics of Butyl Insulation at 125°C." by N. D. Kenney, T. N. Mitropoulos, and W. L. Seamons (all of Simplex Wire & Cable). The authors pointed out that butyl rubber insulated power cables for operation in the voltage range of 600 to 15,000 volts and, in many cases, up to 35,000 volts, have become the work horse for industry circuits in increasing numbers since 1943. In addition, they are also being used more and more by utilities.

Withstand Emergencies

It was explained that in addition to adequate normal load capacities, many modern systems require that power cables be capable of withstanding excess loads under either accidental or scheduled emergency conditions. Such emergencies cause the cable insulation and other components to be exposed to higher than normal temperatures. The authors discussed the effects on the electrical characteristics of butyl rubber insulated cables when the insulation is exposed to, or the conductor is at, a temperature of 125°C. (257°F.) for the various periods of time a cable might be operated under emergency conditions.

Pertinent data were presented relative to the alternating-current, direct-current, and impulse dielectric strengths of Single Conductor, Butyl Rubber-Insulated, Shielded, Neoprene-Jacketed, 5-kv cables when the conductor temperature is at 25°C, 90°C., and at 125°C., and the cables have been aged at elevated temperatures for various periods of time. Other data, such as corona level, insulation resistance, power factor, and dielectric constant, as well as physical characteristic of the butyl insulation were also included in the discussion.

The second paper, co-authored by J. C. Carroll and J. R. Maher (both of G-E), was entitled "Continued Evaluation of Butyl Rubber Insulated Cables." According to the authors, progress in the chemistry, compounding, and processing of insulations, and the fabrication of insulated cables, can be achieved only through continual experimentation and evaluation of new developments. They endeavored to compare the progress with butyl rubber to date with the work previously reported by Messrs. Carroll, Lee, and McKinly in 1955.

The authors presented data showing that the cable with the newer butyl insulation shows improvement over the original material in many areas. They explained that original physical properties are higher, and under normal service at rated temperature, the retention of physical properties show remarkable stability over a period of time. In addition, electrical properties such as power factor, dielectric constant, and insulation resistance have better initial values and stability after long time either under load cycle conditions or in water at either 50° to 75°C. It was also pointed out that the air oven aging data prove the ability of butyl cables to withstand normal operations to 90°C., emergency overload operation to 125°C., and short circuit conditions to 200°C.

Wins Habirshaw Award

► The William M. Habirshaw Award, presented annually by the American Institute of Electrical Engineers, was won by Samuel B. Griscom of Westinghouse Electric Corp. Mr. Griscom was cited "for outstanding contributions to the development and application of improved lightning and short-circuit protection of electric power systems, high voltages for commercial and residential area distribution."

The Habirshaw Award, consisting of a bronze medal, $500 in cash, and a certificate, was established in 1958 through an agreement with the Phelps Dodge Foundation and the AIEE to honor Mr. Habirshaw, a pioneer in the rubber industry and a chemist who initiated the first alternating current high voltage underground cables used in the United States. Mr. Habirshaw founded the Triplex Co. in 1886 to manufacture rubber components. The firm name later was changed to the India Rubber and Gutta Percha Co. Mr. Habirshaw's company was incorporated into the Phelps Dodge Corp. in 1890, and is now known as the Habirshaw Wire and Cable Division.

"Some Factors in the Short-Time Dielectric Strength of Butyl-Insulated Cables" by William A. Beasley (Anaconda Wire & Cable) was the next paper presented. The author stated that a review of the literature on dielectrics and insulations impresses one with its scholarly approach and the intricacies involved in the theoretical analyses of the electrical properties of even the simplest crystalline materials. According to Mr. Beasley it is not feasible at this state of the art to utilize these same techniques in evaluating the dielectric properties of larger molecules, compound, and complex mixtures that are characteristic of rubber and rubberlike insulations. Hence, it is the experimental and empirical approach that is generally employed in studying the parameters affecting polymeric insulations.

Mr. Beasley pointed out that modern vulcanizable rubber insulations contain many ingredients in addition to the basic polymer. By choice of these ingredients, their proportions, and the vulcanizing conditions, the rubber chemist can, within limits, design a compound for the desired electrical, physical, and chemical characteristics. He added that intuitively, and confirmed in the literature, one would suspect that any non-uniformity within an insulation, whether due to undispersed compounding ingredients or foreign contaminants, is particularly detrimental to dielectric strength. The author stated that for this reason, the measurement of the dielectric strength of an insulation subjected to specific types and quantities of contamination is of interest.

Good Electrical Properties

The subject of the fourth paper was "Butyl Network Cable for 260°C. Limiter Operation" by Richard H. Carlson (American Steel & Wire). Mr. Carlson stated that butyl rubber has established itself as an excellent electrical insulation for many applications in both the high and low voltage field. Its combination of heat, moisture, and ozone resistance together with excellent electrical properties provide a rubber insulation which gives the ultimate in reliability at a reasonable cost.

He pointed out that one area in which butyl rubber has not had wide acceptance is as an insulation for secondary network cable. Mr. Carlson explained that the reason for this is that many butyl insulating com-

positions have been found to perform poorly in threshold of damage tests at temperatures of 240° to 280°C. He added that it is well recognized that butyl insulation, with its excellent heat resistance, would make an excellent insulation for network cable provided it would withstand emergency overload conditions.

According to Mr. Carlson, compared with other organic rubbers, butyl rubber is relatively saturated chemically. It contains a few double bonds for chemically cross-linking the polymer chains and most of these bonds are utilized during vulcanization. The result is a material which will not cross-link upon further heating but rather undergoes chain scission or depolymerization. This phenomenon is commonly called reversion. He pointed out that this is in contrast to SBR compounds which always continue to cross-link upon heating and embrittle. According to the speaker, designing a butyl compound for secondary network service resolves itself into a problem of suppression of reversion and attendant gassing and porosity. He went on to show that butyl rubber can be compounded into an insulating composition which meets a 260°C. threshold of damage test while still retaining all desirable properties.

The fifth paper presented was "The Development of Butyl Rubber Insulated Buried Airfield Lighting Cable" by R. C. Graham (Rome Cable). The speaker summarized the results of a three-year technical investigation to determine an optimum direct burial cable for airfield lighting, with special emphasis on low temperature installations.

Causes of Failure

An initial survey of existing installations where cable was operating both satisfactory and unsatisfactory was undertaken to determine causes of failure in airfield lighting systems and, according to Mr. Graham, as a result new requirements for an improved cable together with its installation were established. He pointed out that the laboratory studies indicated that newer insulation materials such as butyl rubber would be better suited physically and electrically for this application.

The next paper dealt with "Design and Manufacture of Butyl Rubber Insulated Dredge Cable" by P. Gibbon and J. M. Campbell (both of Northern Electric, Canada). The authors explained that in many parts of Canada valuable mineral deposits exist in the beds of rivers and lakes. To expose the ore body, electrically operated hydraulic pipe line dredges have been used which require cables of rugged design. They went on to discuss the design, manufacture, and operation of such cables with particular emphasis on the development and types of butyl compounds used.

It was pointed out that dredge cables are subjected to the severest operating conditions under extremes of climate. Sub-zero temperatures, ice flow, mud, silt, and rocks are a few of the external hazards involved. According to the authors, these cables were required to provide power at temperatures as low as −50°F. in winter. Continuous operation of the dredges for four or five years was essential, so reliability was of prime importance.

In addition, the authors stated, it was imperative that the cable have properties of toughness, flexibility, moisture resistance, heat resistance, cold resistance, and ozone resistance, and be competitive economically with previous designs. The authors went on to discuss the different butyl rubber designs which were considered, the final design accepted, its manufacture, testing, and performance.

Surveyed Users

The final paper was entitled "Survey on the Use of Butyl Rubber Insulated Cable" by L. D. Cronin (Ebasco Services), R. E. Hoy (Enjay Chemical), and J. E. Johnson (Philadelphia Electric). The authors explained that a survey was made among users to obtain information on their experience with butyl rubber insulated cable. To review objectively the performance of butyl rubber insulated cable, 574 questionnaires were sent out requesting information on mileage, operating voltage, shielding, terminations, failures, date of earliest installation, and general comments concerning butyl rubber insulated cable.

In their discussion on the general results of the survey, the authors noted that 40 utility users reported no failures on butyl insulated cable and most others reported satisfactory operation although they had experienced some failures. In addition, all but a few indicated that they are extending the use of butyl rubber insulations. The same reports were received by most industrial users.

James L. Weaver

Forms Beckham Company

► James L. Weaver, Jr. has formed a new national sales organization, the Beckham Co., Akron, Ohio, to serve the rubber and plastics industries. Mr. Weaver, formerly associated with the Harwick Standard Chemical Co., is president of the new company and will handle sales in the Midwest. Other members of the Beckham sales staff are: Ralph DeTurk, previously with Cooke Color & Chemical Co., who will be Eastern sales manager; John D. Shaw, formerly with General Aniline & Film Corp., Chicago district sales manager; H. F. Jacober, formerly with Baldwin Rubber Co. and recently with Douglas Aircraft Corp., West Coast sales manager; and Howard Johnson, previously with Ridgway Color & Chemical Co., western New York and western Pennsylvania sales manager.

Beckham recently was appointed technical sales representative by the Ware Chemical Corp., Westport, Conn., and the Ridgway Color & Chemical Co., Ridgway, Penna. The sales organization will handle the companies' full line of rubber chemicals.

Pliovic M-70 Introduced

► Pliovic M-70, a specialty modifier resin for vinyl plastisol compounds used for coating and molding applications, has been added to the commercial product line of vinyl plastic materials by the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio. The resin is being produced at the firm's chemical plant in Niagara Falls, N. Y.

Chicago Hears Easly On Rubber Profession

► The Chicago Rubber Group held a dinner and technical meeting on November 17, 1961, at the Furniture Club in Chicago, Ill. The meeting was attended by 150 members and guests who heard Clem Easly of Cadillac Associates, Inc., talk on the subject "The Rubber Business Becomes a Profession." In his discussion of the invasion of scientific methods in the rubber industry, Mr. Easly, who is a specialist in rubber and plastics personnel for the Chicago employment agency, reviewed the early days of the industry when rubber compounding recipes were kept in a little black book which the boss carried in his hip pocket. He explained that of necessity, it was a very secretive business and the ingredients in these chance compounds were top secret.

Scientists Take Over

According to Mr. Easly, those secretive days were numbered when the scientist reared his ugly head. He wormed his way into a few laboratories and began to introduce definitions, standards, specifications —such as tensile strength, plasticity, elongation. Although first held in contempt, the rubber chemist produced results and the next thing the industry knew — there were scientists everywhere. Now, the speaker pointed out, instead of drummers peddling top secret compounds in competition with other drummers, the industry began pitting chemists against chemists with the result that better materials were being produced. This gave rise to a new breed called technical sales representatives. Mr. Easly told the group that the industry did not fully realize what it was really doing—it was inventing obsolescence. It was creating that which would become the most vital force of progress—a condition of progressive inventiveness which makes of today's top material or product a thing which is completely out-of-date tomorrow.

The next step in the scheme of things is automation, the speaker added. He explained that in the age of the robot, the self-tending robot has not yet appeared. Robots do only what they are told to do. They follow leads given to them by men. Mr. Easly emphasized that robots need men more than men need robots.

Clem Easly (Cadillac Associates), center, was the featured speaker at the November 17 technical meeting of the Chicago Rubber Group. He is flanked, on the left, by T. C. Argue (Roth Rubber), president of the Group, and on the right by Robert Kann (Goodyear), vice-president and program chairman for the Chicago Rubber Group.

Shell Isoprene Latex

► The Synthetic Rubber Division of the Shell Chemical Co. has announced successful commercial production of a completely new product, Shell Isoprene Rubber Latex, at its plant in Torrance, Calif. According to the firm, the product is the result of a major research effort to produce *cis*-1,4 polyisoprene latex which is essentially equivalent to natural rubber latex. During the past year, Shell Chemical has been conducting a market development program with this new synthetic rubber latex, and because of the interest shown, has proceeded to commercial scale manufacture, the company states.

Shell Isoprene Rubber Latex is said to have a high solids content, large average particle size, good mechanical stability, low chemical stability allowing quick gellation, low emulsifier content, and exceptionally low odor. The company reports that the Isoprene latex is of particular interest to manufacturers of dipped and molded goods, latex foam rubber, rug backings, adhesives, and fabric coatings. In addition, products made from the latex have shown good tensile strength, low shrinkage, and excellent color.

Oakite Appoints Two

► Herbert J. Peterson and Edward G. Deibert have been appointed to the technical service staff of Oakite Products, Inc., New York, N. Y. Mr. Peterson joins the Chicago, Ill., office of the company, while Mr. Deibert has been assigned to the Allentown, Penna., office.

Monsanto Names McIntyre

► Phillip E. McIntyre, previously manager of rubber chemicals development for the Monsanto Chemical Co. in Akron, Ohio, has been promoted to product director for rubber chemicals. He succeeds Chester W. Christensen who has retired after 39 years of service with Monsanto and the former Rubber Service Laboratories, which the firm acquired in 1929. In his new assignment, Mr. McIntyre will plan and coordinate all of the division's activities relating to rubber chemicals with responsibility for its profitability and growth in that industry area.

Mr. McIntyre received his B.S. degree in industrial chemistry in 1950 and his M.S. degree in organic chemistry in 1951 from Kansas State University. He joined Monsanto in 1951 as a chemist in the Research Department of the Organic Chemicals Division, and has been a member of the division's Development Department since 1953. He was appointed manager of rubber chemicals development in 1954.

LFE Buys Tracerlab

► Laboratory for Electronics, Inc., Boston, Mass., has announced the acquisition of Tracerlab, Inc., also of Boston, via a stock transaction. The merger provides for the issuance of one share of LFE common stock for each 4½ shares of Tracerlab. The 161,287 shares which were issued for Tracerlab are worth more than $6,200,000 based on a current market of $38.00 a share for LFE stock.

C. E. Cain

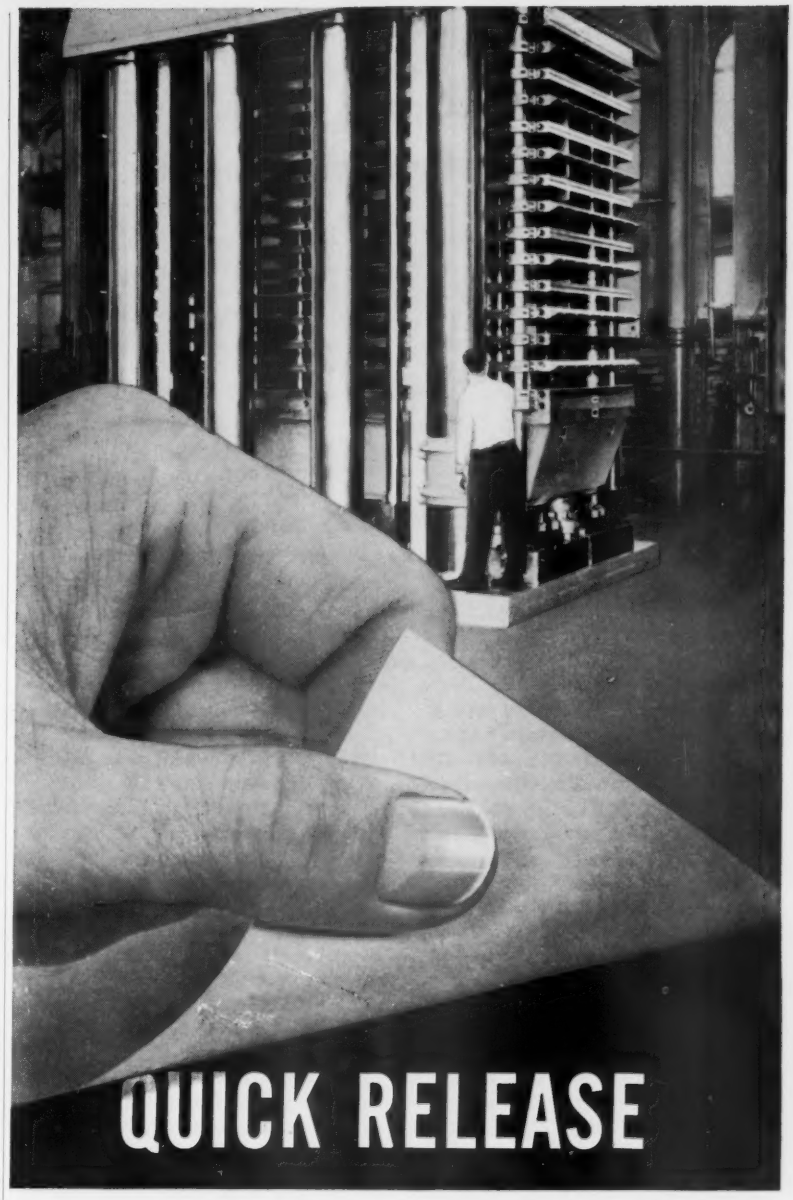
Named by Alco Oil

► C. E. Cain has been named sales manager of the Alco Oil & Chemical Corp., Philadelphia, Penna., and Dr. Thomas F. Jacoby succeeds him as assistant technical director. Mr. Cain earned his B.S. degree in chemical engineering at the University of Oklahoma in 1941. Prior to joining Alco Oil in 1952 as head of the sales service laboratory, Mr. Cain had been associated with the Toyad Corp. as chief chemist, and with the Firestone Tire & Rubber Co. as a sales engineer and process control engineer at the firm's synthetic rubber facility in Lake Charles, La. Mr. Cain is a member of the American Chemical Society and the Philadelphia Rubber Group.

Dr. Jacoby earned his B.S., M.S., and Ph.D. degrees at Lehigh University, all in the field of chemistry. He most recently was the head of the Textile Division of Consumers Union, and prior to that, served as chief chemist for A. & M. Karagheusian, Inc.

Goodyear Buys Geneva

► Goodyear Tire & Rubber Co., Akron, Ohio has purchased Geneva Metal Wheel Co., Geneva, Ohio. The Geneva company will continue to operate under its present management with H. A. Ford, formerly executive vice-president, as president. H. A. Carter, former Geneva president, is serving the company as a special consultant. Geneva operations will continue under present policies and with present employees, and manufacturing will be expanded as market opportunities increase, a spokesman for Goodyear stated.



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Southern Rubber Group Holds Fall Meeting in Memphis

The Fall Meeting of the Southern Rubber Group was held on November 17 and 18 at the Chisca Plaza Motor Hotel in Memphis, Tenn. More than 300 persons were registered for the meeting, an all-time high for the regional group. A total of seven panelists presented papers at two technical sessions.

The symposium on "Compounding and Use of Latex Materials" was moderated by Leon Talalay (Goodrich) and the panelists and their subjects were: "Latex Compounding," by Onslow B. Hager (Alco Oil and Chemical); "Synthetic Latices for Foam," by J.M. Mitchell (Polymer Corp. Ltd.); "Stereospecific Polymer Emulsions," by Kenneth W. Schmit (Shell Chemical); and "Carboxylated Latex Compounds," by J. P. Davis (Goodyear).

The moderator of the second symposium, "Designing of Colored Rubber Compounds," was C. M. Butler (Naugatuck Chemical). The panelists and their subjects were: "Designing Colored Rubber Compounds," by Clyde Jones (Rubbermaid); "Techniques of Measuring Color," by Arthur E. Hicks (Petroleum Chemicals); and "White Sidewall Compounding," by V. T. Mack (Goodyear).

The first panelist, Mr. Hager, stated that latex compounding for foam carpet backing, and compounds for upholstery backing are particularly important to the Southeastern United States. With cost a continuing pressure on the latex compounder, he reported that there are two alternatives which may be considered. On the one hand, the latex technologist can reduce price, by substituting cheaper ingredients, or adding filler, or both. On the other hand, he can produce a higher priced compound that will produce marked savings in the entire process.

Compounding Problems

Mr. Hager, who is vice-president and director of research for Alco Oil and Chemical, added that in addition to the cost factor, there are at present other problems that confront the compounder of latex. Three of these are: (1) the retention of mechanical and chemical stability during making, storage, and use; (2) the correlation of accelerated and in-service tests, and (3) compounding equipment. He stated that latex is subjected to vigorous agitation from the beginning of compounding to the final application. For this reason, mechanical, and chemical stability, and viscosity, rate of drying and maturation are all factors that have to be carefully considered by the compounder.

Due to competitive pressures between suppliers, and the constant urge of textile mills for higher productivity (which they get by increasing the temperatures of their drying four periods: 1926-1935—the birth and curing ovens), compounders have been gradually increasing the severity of the exposure in accelerated aging tests. These two facts, Mr. Hager stated, have induced a faith in super-accelerated tests which is not justified. In regard to compounding equipment, the panelist stated that because of the nature of latex handling, ready made stock item mixers typically are unsuitable and require modification by the compounder. Volume measurements, because of foam accumulation, are frequently inaccurate, and for this reason, most compounding facilities set up in the last decade have arranged to make all measurements by weight.

The second panelist, Mr. Mitchell, stated that advances in the technology of emulsion polymerization and the development of techniques for coalescing clusters of small latex particles in larger ones have assisted in manufacture of SBR and NBR latices which can be used in production of good quality foam rubber. These latices are characterized, he stated, by high solids content and low viscosity, and can be used alone or in blends with natural rubber.

Discusses Foam History

The panelist, who is chief of synthetic latex development for Polymer's Sarnia, Ontario, Canada, operation, also reviewed the history of latex foam, which he divided into of the industry, and the Dunlop process; 1936-1945—attempts to use hot SBR latex, and development of the Talalay process; 1946-1955—improved synthetic latices, and a rapid growth of the industry; and 1956-(1965)—continued growth, with serious competition from polyurethane, and 100 per cent synthetic latex foam. Mr. Mitchell predicted that if the progress in the technology of synthetic latex made between 1956 and 1960 continues, the use of latex foam rubber will continue to expand during the 1960's.

The third panelist, Mr. Schmit, reported that with the advent of solid stereospecific polymers, the development and commercialization of the corresponding latices has been anticipated by many rubber goods manufacturers. He added that market development work is presently being conducted with the first commercial *cis*-1,4 polyisoprene latex. Although field evaluations have been limited,

Panelists for the Southern Rubber Group symposium on "Compounding and Use of Latex Materials." Left to right, seated: J. P. Davis (Goodyear), Kenneth W. Schmit (Shell Chemical), J. M. Mitchell (Polymer Corp.); and Onslow B. Hager (Alco), and standing, Leon Talalay (Goodrich), moderator.

he stated, the evidence to date is that the similarities as well as the differences between this and other currently available materials will offer both flexibility and versatility to the latex compounder.

Mr. Schmit, of Shell's Product Development Department, Synthetic Rubber Division, reported that Isoprene rubber latex is characterized by high solids content, relatively low viscosity, and compatibility with natural and SBR latices. Mechanical stability is higher than that of natural latex, but chemical stability is quite short. As a latex for use in foam manufacturing processes, he reported, it is characterized by high hot, wet tensile strength, fast, sharp gelation, and excellent elongation. Other potential applications he cited include dipped goods, rug-backing, and adhesives.

In the discussion of carboxylated latex compounds, Mr. Davies, with Goodyear's Chemical and Material Development Department, reported that carboxylic latices offer four benefits: increased versatility and adaptability to multi-purpose compounding, a unique cure method, improved adhesion to metals and fibers, and improved mechanical stability.

Functions of Carboxyl

The panelist reported that the degree of carboxylation can range from a half per cent to levels in excess of 20 per cent. At the lower end of the scale, the neutralized carboxyl groups function primarily as stabilizers. Above ten per cent, carboxylation results in alkali soluble polymer with high neutralization viscosities. Mr. Davies also reported on the cure properties of carboxylic latices, and specifically on rubberlike elastomers based on butadiene-styrene compositions.

Panelists for the Southern Rubber Group symposium on "Designing Colored Rubber Compounds." Left to right, Clyde H. Jones (Rubbermaid), Vernon T. Mack (Goodyear), Arthur E. Hicks (Petroleum Chemicals), and C. M. Butler (Naugatuck Chemical), who served as moderator.

The first speaker on the colored rubber symposium, Mr. Jones, gave a step-by-step guide to building practical colored rubber compounds, and the principles used in achieving satisfactory end results. He stated that it is impossible to remove dirtiness which is put into a compound through off-color ingredients. The lightest, cleanest brightest materials must be used if clean, crisp products are to result. Sulfur content, he indicated, should be kept low, and a most careful selection made of the coloring agents and quantities used.

Mr. Jones, who is Rubbermaid's assistant manager of research and development, pointed out that as SBR rubbers have improved in color, his firm has shifted more and more to them from pale crepe. Smoked sheets and dark, poorer grades of rubber are entirely unsatisfactory, he indicated. In order to achieve good results, all resins and additives should be of the lightest color possible with complete uniformity of color essential when matching to a standard. By using white fillers, less titanium dioxide is required and consequently less color.

In his discussion of color measuring techniques, Dr. Hicks reported that the concepts of color are not simple, and in fact, vary from physicist, to physiologist, to consumer. The problem, he indicated, is measuring "color" but selling "appearance." In the measurement of color, Dr. Hicks, who is research chemist for Petroleum Chemicals, stated that visual methods of test for appearance are simple and direct, but sometimes require several light sources of different spectral character. Dr. Hicks also listed some ten color-measuring instruments, and described in detail the characteristics of several of these.

Carbon Black Stains

The panelist also stated that white sidewall color measurement has been a problem of considerable importance to the colorists in industry. One current project he mentioned is concerned with developing a method capable of measuring the staining tendencies of carbon blacks used in the carcass compounds underlying white sidewalls. In this project, still on-going, the speaker reported that a series of samples of compounds having colors ranging from white to a yellow (equivalent to a badly stained white), were sent to various laboratories for color measurement. The purpose of this project was to develop a working standard on which subsequent work could be based.

The final speaker, Mr. Mack, who is senior compounder at Goodyear, described the changes which have occurred in white sidewall styling from the 1920's to the present. He stated that at the present time, 50 per cent of tires produced are white sidewall, the trend sloping upward

Charles M. White (Cabot), vice-chairman of the Southern Rubber Group, presents special award for service to (right) Lenoir Black (C. P. Hall), immediate past-chairman of the Group.

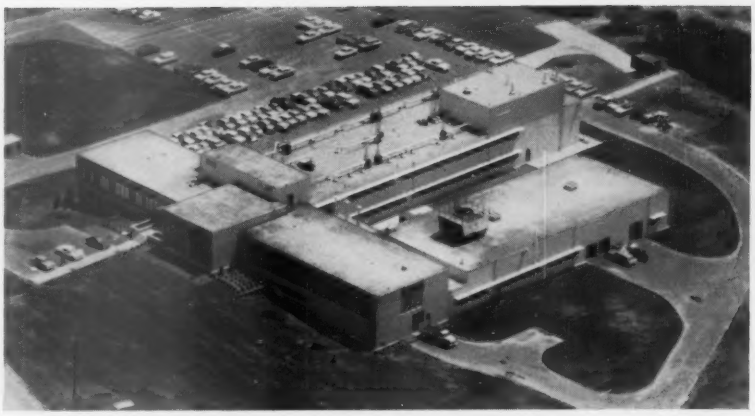
from a 20 per cent figure in 1952 to twice this in 1955. Many of the characteristics required of the white sidewall are the same as those desired in black compounds.

The unique properties include a good final whiteness which requires special selection of materials and special handling. Where the sharp black-white demarcation is obtained by grinding, the compound must also be able to withstand grinding and buffing without "chattering." At the present time, he indicated, natural rubber is still the most popular material for white sidewalls but its position is by no means secure. He predicted that both red and blue will become increasingly important sidewall colors along with white. He noted that these colors have been in production for a few months and are just being introduced on the market.

At the banquet on Friday evening, Nov. 17, Dr. J. P. McKenzie (United Carbon) presented the Southern Rubber Group's Harmon Connell Memorial Scholarship Award to Mr. Robert F. Ellis, senior chemistry student at Mississippi State University. This was the fifth annual $500 award to an outstanding student in the chemistry or chemical engineering department at the University. The Southern Rubber Group's Man of the Year Award was presented to Mr. Elden H. Ruch (Firestone).

It was also announced that the next meeting of the Group will take place February 2 and 3, 1962, at the Statler-Hilton Hotel in Dallas, Texas. Two panels are scheduled for the technical sessions at that meeting, the first on "Curing", and the second on "Reinforcement."

Dr. James P. McKenzie (United Carbon) presents Harmon Connell Memorial Scholarship Award to (right), Robert F. Ellis, Mississippi State University student.



An aerial view of the new Research and Development Center of the General Tire & Rubber Co., Akron, Ohio.

General Tire Opens Research Center

► General Tire & Rubber Co., Akron, Ohio, has opened its new $2,200,000 research and development center, located near its general offices and Akron plant. As part of its plan for the Research and Development Departments to perform their functions in a centralized location, General Tire has moved its scientists, researchers, and engineers into the new two-story structure. The Center is unique in that both Central Research, which is essentially a well-equipped chemical research laboratory, and Central Development, which has the responsibility for new product development primarily in rubber and plastics, have both been put under one roof, according to the company.

The Research Center is a functionally designed U-shaped building, which has one wing of two stories occupied by the Central Research Laboratories, a high bay wing for the Central Development Laboratory, and a two-story area for offices, library, and a drafting room across the front with the street entrance at the upper level. The new facility provides a total of 71,495 square feet of floor space. It is estimated that some 500 items of testing and research equipment have been installed in the new building.

Directly east of the Research Center, the firm's $2.2 million Tire Test Center is nearing completion. This center will be ready when the installation of a powerful dynamometer is completed. According to General Tire, this dynamometer will be capable of speeds up to 350 mph, tire loads of 100,000 pounds, and accelerations and decelerations previously impossible.

BFG Buys Tire Outlets

► B. F. Goodrich Co., Akron, Ohio, has acquired from the Vanderbilt Tire & Rubber Corp., New York, N.Y., its leased tire and automotive equipment outlets operating in department stores. Thirty-seven leased departments of Vanderbilt are presently operating in such stores as Macy's, Bamberger's, Wieboldt's, the May Co., as well as other major department stores throughout the United States. Most of the leased departments are located in Metropolitan New York, Los Angeles, San Francisco, and Chicago areas.

Natta Giving Paper

► Prof. Guilio Natta, recently awarded the First International Synthetic Rubber Gold Medal, will present a technical paper at the 18th Annual Technical Conference of the Society of Plastics Engineers, to be held on January 30 to February 2, 1962 at the Penn-Sheraton Hotel in Pittsburgh, Penna. The subject of Dr. Natta's paper will be "Progress in Stereo-Regulated Polymers." Approximately 100 additional papers will be read during the conference, which has as its theme "Plastics Revolutionize Design."

H. F. Wakefield

Retires from Carbide

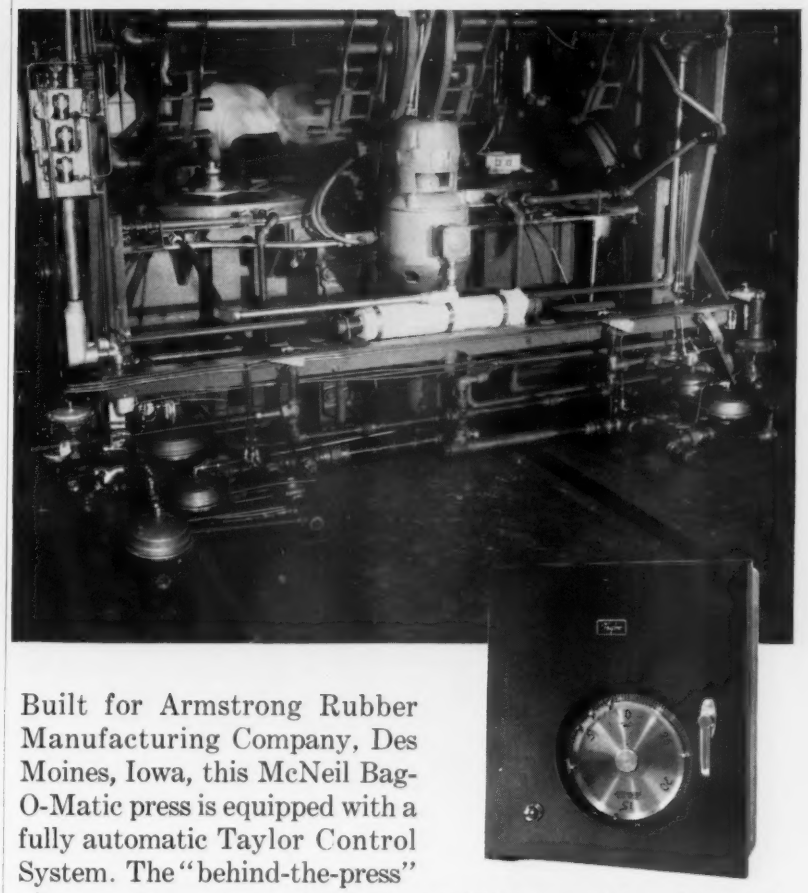
► H. F. Wakefield, manager of the Phenolic and Epoxy Market Development Department of the Union Carbide Plastics Co., New York, N. Y., has retired after 38 years of service. Mr. Wakefield joined the research and development laboratories of the Bakelite Corp., in Chicago, Ill., in 1924. Bakelite became part of the Union Carbide Corp. in 1940. Mr. Wakefield remained with the laboratories until 1945, when he was assigned to work in market development. His main areas of interest were in phenolic, epoxy, and silicone resins for adhesives, waterproof backings for pressure-sensitive adhesives, and vinyl butyral-phenolic adhesives.

Mr. Wakefield is a member of Committee D-14 on Adhesives of the American Society for Testing and Materials, the American Chemical Society, the Adhesives and Sealants Planning Committee of the Building Research Institute, and the Adhesives Testing Committee of the Technical Asociation of the Pulp and Paper Industry. In 1960, he was chairman of the Gordon Research Conference on Adhesion. Mr. Wakefield plans to remain active in the adhesives field as a consultant specializing in elastomer-resin combinations, and in construction, building, and highways applications.

Cabot Gets FPC Rights

► Cabot Corp., Boston, Mass., has entered into an agreement with Fabriques de Produits Chimiques de Thann et de Mulhouse, Thann (Haut-Rhin), France. Under the agreement, Cabot will have the exclusive rights in the United States to Fabriques de Produits Chimiques patents and know-how relating to the production of pigment grade titanium dioxide through the flame chloride process.

TAYLOR CONTROLS
PRESSING PROBLEMS
AT ARMSTRONG RUBBER



Built for Armstrong Rubber Manufacturing Company, Des Moines, Iowa, this McNeil Bag-O-Matic press is equipped with a fully automatic Taylor Control System. The "behind-the-press" picture, above, shows six Taylor 1078V Series Piston-Actuated Valves and one 1000V Series Valve with exclusive reversible actuator. These 1078V valves, designed for hot and cold service to 400° F., are sequenced by a Taylor FLEX-O-TIMER® Timed Program Controller.

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MAN IN THE NEWS

HERMAN R. THIES

In a rare moment of relaxation, H. R. Thies studies a text on oil exploration. In the foreground are several samples of oil-bearing rock.

► Herman R. Thies, who was signally honored in June of this year by being elected president of the International Institute of Synthetic Rubber Producers, is a man who has made many valuable contributions to rubber chemistry. The honor is a fitting distinction for Mr. Thies, general manager of the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, whose energies and abilities have played a major role in advancing the relatively young synthetic rubber industry to a position of prominence.

Raised in Oklahoma

Although born in Peck, Kansas, on September 27, 1895, most of his youth was spent in Enid, Okla., where he attended grade school, high school, and, ultimately, Phillips University, from which he graduated in 1917 with a bachelor's degree in chemistry.

He relates that his father, a homesteader in the Dodge City area of western Kansas, became a surveyor for the Santa Fe Railroad and eventually became affiliated with the Federal Land Office which was responsible for handling claims and deeds of homesteaders. It was through this that the Thies family moved into the famous Cherokee Strip in western Oklahoma and took up a claim on a town lot in Enid which had been laid out on the old Chisholm Trail.

Interest in Petroleum

From his earliest days, Mr. Thies was interested in petroleum chemistry—an interest which continues to this day. He admits to being an "armchair" oil explorer, and has even invested in several oil-drilling ventures.

Following military service during World War I as a 1st lieutenant of heavy artillery in the 36th Division, he personally visited a number of eastern and mid-western universities looking for a school that offered a degree in petroleum chemistry. Failing to find anything of this nature at that time, Mr. Thies settled on the next best thing, organic chemistry, and in 1920 graduated from the University of Chicago with his master's degree. He recalls that he financed his graduate schooling by growing a wheat crop back in Oklahoma.

His first job took him to Akron, Ohio, and the Miller Rubber Co., now no longer in existence. He was hired as a chemist, but the depression of the 1920's had caused many personnel cutbacks and he settled for a job as a heel maker in the Miller plant.

First Crossroad

Several months later, Mr. Thies says, "I came to the first big crossroad in my life. I had the opportunity of going to Texas A&M as a chemistry professor, or staying on at Miller Rubber, which finally had found a spot for me in its laboratory —but at $300 less per year than the teaching job."

Needless to say, Mr. Thies decided to stay in industry, and he embarked on a career that never stopped moving ahead. At Miller Rubber, he soon became director of the test laboratory and eventually assistant director of research. In 1930 he joined the Goodyear Tire & Rubber Co. as a research compounder, and just two years later was appointed assistant director of research for the world's largest rubber company.

Second Crossroad

In 1943, Mr. Thies came to another major crossroad — whether to continue in research or enter the sales field. He chose the latter and became manager of the Plastics and Coatings Department which Goodyear has organized as a sales outlet for several chemical products that had been developed under his guidance.

For almost a year during World War II, Mr. Thies was special consultant on plastics for the U.S. Army Military Planning Division, Office of the Quartermaster General. This, he says, was a commuting job which found him spending weekdays in Washington, D.C., and then returning to Akron and his post at Goodyear on the weekends.

The war over, he again took up the reins of the Plastics and Coatings Department full time, and when Goodyear organized its Chemical Division in 1948, Mr. Thies was

appointed its general manager. Under his organization and leadership, the Goodyear Chemical Division now ranks among the nation's top chemical operations.

During his 31 years with Goodyear, Mr. Thies has written a number of scientific and technical papers and has been awarded a number of patents relating to rubber and rubber chemistry. Among his accomplishments was the discovery of a petroleum-based softener for rubber to replace expensive pine tar. He also worked out an organic acceleration for producing rubber floor tile, and discovered that clay and carbon black absorb accelerators in rubber compounds, thus retarding cure.

Many Contributions

Mr. Thies developed and went on to guide commercial introduction of a cyclized natural rubber resin used for paints, printing inks, and moisture-vapor proof paper coatings. He was instrumental in introducing to commercial markets such new products as synthetic rubber paint resins, Pliobond adhesives, nitrile and other types of synthetic rubbers.

In 1958, Mr. Thies returned to his alma mater for the school's golden anniversary commencement service, and was awarded an honorary doctor of science degree by Phillips University.

His wife, Mildred, also is a graduate of Phillips University, class of 1919. They were married on June 24, 1923, and today, the Thies home is at 3794 Darrow Road in Stow, Ohio.

Among Mr. Thies' hobbies are photography—he likes to make movies of animals—and stamp collecting. His nearly complete collection of United States Commemoratives has been acquired over a 30-year period. He has an avid interest in geology, backed up by an excellent home library on the subject.

A vacation of several years ago found the Thies family on a two-week, 180-mile float trip down the San Juan and Colorado Rivers. "Here was excitement, adventure, and a tremendous history of geology all in one bundle in a never to be forgotten experience," Mr. Thies says.

However, he considers his most important interest to be his family. His son Larry, has entered the chemical sales field, while his daughter, Patty Ann, is an accomplished musician and teacher. Three grandchildren, ages 11, 8, and 5, as well as Rex, a massive Great Dane, and Misty, a full-blooded Siamese cat have eliminated any problems he and his wife may have in the matter of spare time. "Still," he says, "we find time to travel, and we drive wherever we go."

An avid stamp collector, Mr. Thies shows one of his prized U. S. Commemoratives to his wife, Mildred.

At the present time, Mr. Thies is an active member of the American Chemical Society, the American Institute of Chemical Engineers, the Manufacturing Chemists' Association, the National Paint, Varnish and Lacquer Association, the University Club of Akron, and the Marco Polo Club of New York.

Second IISRP President

As the second president of the International Institute of Synthetic Rubber Producers, Mr. Thies heads an organization of 16 synthetic rubber manufacturing firms aimed at promoting the interests of synthetic rubber manufacturers and the public in production, engineering, safety, transportation, and other industry problems.

According to Mr. Thies, the Institute also is considering sponsorship of several fundamental research projects. These include investigations of test methods relating to molecular weight distribution, chemical analytical test methods for determining components of synthetic rubber, and a method of determining viscosity of rubber during manufacture. These are programs that should move well ahead during Mr. Thies' energetic tenure as president of the international synthetic rubber organization.

Philadelphia Group Elects 1962 Officers

► The Philadelphia Rubber Group elected its officers and directors for 1962 at a brief business meeting held during its Annual Fall Dance on November 3, at the Manufacturers Country Club, Oreland, Penna. The 1962 officers and directors are:

Chairman, Richard M. Kerr (H. K. Porter); *Vice-Chairman,* Henry F. Smith (Naugatuck Chemical); *Secretary-Treasurer,* William J. Macomber (U.S. Rubber); and *Directors,* James J. Broderick (American Cyanamid) and John F. Corr (Vulcanized Rubber & Plastics).

The Annual Fall Dance was attended by over 130 couples, and many door prizes were won by the ladies. Music for the dance was played by Bill Collins and his orchestra.

UCC Develops Plasticizer

► A vinyl plasticizer featuring high-solvating power combined with fast-solvating action has been introduced by the Union Carbide Chemicals Co., New York, N. Y. The company reports that the new product, Flexol Plasticizer RK-1, is particularly suited to the requirements of vinyl flooring, and is an effective plasticizer for vinyl film, vinyl extruded goods, vinyl foam, vinyl copolymer resins and acrylic lacquers. Flexol Plasticizer RK-1 is said to offer the following advantages over previously available vinyl plasticizers: higher vinyl resin solvating power, lower asphalt solvation, less migration to asphalt and rubber, lower specific gravity, superior oil resistance, and superior traffic-stain resistance.

GAI Buys Linear

► Great American Industries, Inc., New York, N. Y., in a cash transaction, has purchased Linear, Inc., whose main rubber plant is in Dallas, Penna., with research and development laboratories in Philadelphia, Penna. Linear, which will be a wholly owned subsidiary of Great American, does a volume business of between five and six million dollars in specialized molded rubber and packings, catering particularly to the automobile, aircraft, electronic, missiles, rocket and space industries. James G. Groendyk, head of rubber operations for Great American, will be president of the new subsidiary.

Names in the News

Harry E. Dieckman, formerly associated with the O'Sullivan Rubber Corp., has been named special assistant to the vice-president in charge of manufacturing at the Bearfoot Sole Co., Wadsworth, Ohio.

L. T. Greiner, formerly Pacific zone manager for the B. F. Goodrich Co., Akron, Ohio, has been appointed assistant to Goodrich president J. Ward Keener.

Ivan W. Benson has been named sales representative for Barrington Industries, Inc., Providence, R. I., covering North and South Carolina, Georgia, Alabama, eastern Tennessee and northern Florida.

Wilfred L. Brown, formerly assistant to the general sales manager, has been appointed manager of distributor sales for the Okonite Co., Passaic, N. J.

Joseph A. Conlon, previously marketing manager of the Rubber Products Division of the Dayco Corp., Dayton, Ohio, has been named vice-president, sales, of the division.

Bruce E. Esterly, financial vice-president and treasurer of the Cooper Tire & Rubber Co., Findlay, Ohio, has been elected treasurer of the Toledo Control of the Controllers Institute of America.

Carl T. Lenk, formerly research manager at Wyandotte Chemicals Corp., Wyandotte, Mich., has been named manager of inorganic research for the firm.

E. R. Perry, president of the National Vulcanized Fibre Co., Wilmington, Del., has been elected chairman of the Insulating Materials Division of NEMA.

Cleveland Lane, formerly assistant to the president of the Manufacturing Chemists' Association, Inc., has been named assistant to the president of Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio.

E. David Gordon has been appointed vice-president and general manager of the Sperry Rubber & Plastics Co., Brookville, Ind.

Stephen K. Hawkins, national sales manager of general products for the Flexible Tubing Corp., has been relocated at the company's headquarters at Guilford, Conn.

Robert Kent, who previously served as assistant general manager of the Stokes Molded Products Division of the Electric Storage Battery Co., Trenton, N. J., has been appointed general manager of the division.

Charles B. Miller, formerly technical supervisor for research in organic fluorine chemistry, has been appointed assistant technical director, responsible for laboratory research and special laboratory projects in the General Chemical Division of Allied Chemical Corp., New York, N. Y. **Dr. Curtis B. Hayworth,** formerly director of development research, has been named assistant technical director, responsible for development research and planning research.

Robert E. Kinnen, previously associated with the Dunlop Tire & Rubber Corp., has joined the Seiberling Rubber Co., Akron, Ohio, as director of merchandising and advertising.

William Wishnick has been elected president and chief executive officer of Sonneborn Chemical and Refining Corp., New York, N. Y., succeeding **Rudolf G. Sonneborn,** who was made chairman.

Edward W. Upton, formerly associated with the New York Rubber Co., has been appointed manager of the Rubbercap Division of Plastic Applicators, Inc., Houston, Texas.

Carl E. Hopkins, formerly associated with the Brunswick Rubber Co., has been named chief chemist for the Metal Hose & Tubing Co., Dover, N. J.

Richard B. Anderson has been named a sales representative in South Carolina, Georgia, Alabama, Tennessee, Mississippi, and Arkansas for the Industrial Division of Nopco Chemical Co., Newark, N. J.

Harold Bond has joined the Reeves Rubber Co., Inc., San Clemente, Calif., as project engineer.

William N. Farlie has been named to the newly-created post of coordinator of advertising and sales promotion at the New York City headquarters of the Esso Standard Region, Humble Oil & Refining Co. **Robert M. Gray,** previously manager of advertising and sales promotion at Esso Standard, has been named to the same post in the new Marketing Department of Humble Oil.

Vincent Scalese has been promoted from manufacturing engineering manager to production manager of machine shop operations at the Textile Machine Works, Reading, Penna. **Richard C. Bodey,** formerly assistant to Mr. Scalese, succeeds him as manufacturing engineering manager. **John W. Warren,** formerly foundry production manager, has been named operations manager-foundry.

Robert J. Jacobs, vice-president and general manager of the Waldron-Hartig Division of the Midland-Ross Corp., Cleveland, Ohio, has temporarily assumed the general management responsibilities for the J. O Ross Engineering Division, succeeding **Chester J. Schmidt,** who has retired as vice-president and general manager, but who will continue to serve in an advisory capacity.

A. N. Masse, formerly associated with the B. F. Goodrich Chemical Co., has joined the advanced water treatment research program of the U. S. Public Health Service at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.

Frank E. Parsons, previously associated with the National Mineral Wool Insulation Association as industry engineer, will direct national sales for the polyurethane foam products of Allen Industries, Inc., Rahway, N. J.

Dr. William R. Johnson, Jr. has been named manager of new products applications for the Chemical Division of General Tire & Rubber Co., Akron, Ohio.

Joseph A. Conlon has been named vice-president of rubber product sales for the Dayco Corp., Melrose Park, Ill.

Robert E. Hugus has been named vice-president of Davidson Rubber Co., Dover, New Hampshire.

New G-E Silicone Unit

► A new $1 million process plant for the production of new types of intermediate silicone chemicals has been put on stream at Waterford, N.Y., by the Silicone Products Department of the General Electric Co. The facility is part of a current expansion program involving nearly $5 million in new plants and equipment, which was started at the Waterford location in April, 1960. Already completed is a $1 million silicone fluids finishing facility, which went into operation late in 1960. This facility is now producing finished silicone fluids, dispersions, emulsions, and specialty products. The Waterford plant is a completely integrated silicone production operation. According to G-E, finished silicone materials produced there are used in more than 1500 different applications ranging from high temperature pains to thermal insulation for missiles and space vehicles.

Four Grades Developed

► Four new special grade synthetic rubbers designed for electrical applications and end products requiring high purity have been introduced by the Chemical Division, Goodyear Tire & Rubber Co., Akron, Ohio. The new products have been added to the Goodyear line of Plioflex styrene-butadiene rubbers and mark the company's entry into the electrical grade SBR market. Excellent resistance to water or moisture absorption in addition to good electrical properties are the chief characteristics of the new materials which include a hot and a cold type and two cold, oil-extended types, the company stated. Typical applications include light colored molded and extruded mechanical goods for electrical service, wire and cable insulation, wringer rolls, gaskets and other products in contact with water.

Fisher Expands

► The Chemical Manufacturing Division of Fisher Scientific Co., Fair Lawn, N. J., a producer of laboratory chemicals, has expanded into the bulk chemical line. Marketing emphasis will be on custom manufacture of bulk chemicals to meet any requested specifications or form required. In addition, Fisher is regularly stocking 175 bulk chemicals. Distribution will be from 14 Fisher branches in the United States and Canada.

George J. Sella, Jr.

Promoted by Cyanamid

► George J. Sella, Jr., previously sales manager for rubber chemicals, has been appointed manager of the Rubber Chemicals Department of the American Cyanamid Co., Bound Brook, N.J. He will have the responsibility for all phases of Cyanamid's domestic rubber chemicals business. Mr. Sella is a graduate of Princeton University and the Harvard Graduate School of Business Administration. He joined Cyanamid in 1954 and served two years in engineering and production capacities at the firm's Bound Brook plant before joining the rubber chemicals marketing group. Starting with the department as a sales representative, Mr. Sella later was named product manager, a post which he held until his appointment last year to head the department's sales organization.

Richardson Moving Plant

► Richardson Co. has announced plans to close down its production facilities at Melrose Park, Ill. and move these operatons to other facilities. The transfer is expected to take place in the summer of 1962. Tentative plans call for the retention of company administrative offices at Melrose Park and to sell the 340,000 square foot production plant and the 25-acre site. The company has also announced the completion of negotiations for a new plant to be built during the coming year at DeKalb, Ill. Company officials state that the Insurok Division (formerly the Plastics Division) will construct a 90,000 square foot facility on a 13-acre site in DeKalb. The Insurok Division, now located at Melrose Park, produces a complete line of plastic laminated sheets, rods, tubes and molded laminated products.

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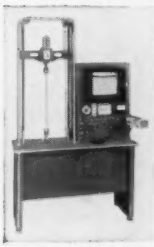

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Richard J. Jones

In Pennsalt Sales Post

► Richard J. Jones has been named a technical sales representative for the Industrial Chemicals Division of the Pennsalt Chemicals Corp., Philadelphia, Penna. He will be headquartered in the firm's Akron, Ohio, sales office, and will specialize in sales and technical service activities to rubber industry firms in the Central States region. Mr. Jones majored in chemistry and biology at Mount Union College, graduating with a B.S. degree. Prior to joining Pennsalt, he held various positions in field sales, technical service, and process development with chemical industry firms. He is a member of the American Chemical Society and the Akron, Southern Ohio, and Fort Wayne Rubber Groups.

Beebe Builds New Unit

► Beebe Rubber Co., Nashua, N. H., has started construction of a new unit which will be attached to the main plant. One section of the unit will be 32 feet high to accommodate an additional Banbury mixer as business expands and additional production capacity is needed. Most of the new area will be used for warehousing Ripple Soles. The company also announced at the same time that James E. Williamson, a chemical engineer with the firm, has been promoted to laboratory manager. Before coming to Beebe, Mr. Williamson was manager of process engineering at the Tyer Rubber Co.

► Hercules Powder Co., Wilmington, Del., has published a technical booklet on the processing of cast polypropylene films.

Every Member Get A Member

► The Membership Committee of the Division of Rubber Chemistry of the American Chemical Society is embarking on an ambitious program to increase and strengthen the membership of the division. The purpose of this membership drive is to broaden the participation in the Division of Rubber Chemistry which in turn will allow the division to provide more and better service to the members of the profession of rubber chemistry.

The Membership Committee of the Division of Rubber Chemistry is asking the present members of the division to try and get one member each to join the division and is asking members of the various sponsored rubber groups throughout the country to consider membership in the division. It is not necessary to be a member of the American Chemical Society in order to join the Division of Rubber Chemistry. The division has a class of associates specifically designed for those who are not and do not wish to be members of the American Chemical Society.

Currently, the Division of Rubber Chemistry benefits its members in the technology of the rubber industry in five main ways. There is the publication of "Rubber Chemistry & Technology." This excellent quarterly, plus one issue of "Rubber Reviews" is sent free to all members of the division. The division has published monographs which are made available to members at the most reasonable cost possible. A "Rubber Bibliography", covering yearly periods, is sent free to members. The Rubber Division Library, the most complete collection of rubber literature in the world is maintained by the division in Akron, Ohio, and service from the library is available to members simply by requesting it. This service is either free or very nominal in cost. Twice yearly, technical meetings are held which are open to all interested parties, however, members benefit from a reduced registration fee.

Information on membership in the Division of Rubber Chemistry may be obtained from D. F. Behney, treasurer of the division whose office is at Harwick Standard Chemical Co., 60 S. Seiberling St., Akron 5, Ohio, or M. J. O'Connor, who is chairman of the Membership Committee, and who has offices at O'Connor & Co., 4667 N. Manor Ave., Chicago 25, Ill.

Donald E. Jones

Named Sales Manager

► Donald E. Jones has been appointed sales manager of the U.S. Rubber Reclaiming Co., Buffalo, N.Y. He is a graduate of Case Institute of Technology, where he received a B.S. degree in chemical engineering in 1947. Since joining U.S. Rubber Reclaiming in 1955, Mr. Jones has served as a sales representative, chief chemist, and production manager.

Named by Cyanamid

► Dr. James G. Affleck has been appointed assistant general manager of the Commercial Development Division of the American Cyanamid Co., New York, N.Y. Dr. Affleck joined Cyanamid in 1949, shortly after receiving his doctorate in organic chemistry from Princeton University. In 1955, he was named manager of the New Product Development Department and in 1957 he became manager of the Rubber Chemicals Department of the Organic Chemicals Division.

See Improved Tire Wear

► Improved tire wear may result from vinylpyridine synthetic rubber compounds, according to Dr. William F. Brucksch, manager of basic research for the Naugatuck Chemical Division of the U.S. Rubber Co., Wayne, N.J. Dr. Brucksch states that vinylpyridine rubber is highly resistant to abrasion and will perform well in tire treads and conveyor belts. The addition of certain inorganic chemicals gives the rubber even higher performance, he adds.

Natta Honored At Industry Dinner

► The synthetic rubber industry paid tribute to Dr. Giulio Natta at a dinner held in his honor on October 3 in London, England. Dr. Natta was awarded the First International Synthetic Rubber Gold Medal for his discoveries in stereospecific polymerization and isotactic polymers. The award, sponsored by *Rubber and Plastics Age (London)*, was presented by Sir G. Edward Beharrell, chairman of the Dunlop Rubber Co. and of the International Synthetic Rubber Co. Dr. Natta was introduced, to over 170 persons attending the dinner, by Sir Robert Robinson, one of the world's leading organic chemists and a Nobel Prize Winner, who is a director of the Shell Chemical Co.

Theme of Polymerization

In his introductory remarks, Sir Robert stated that "Natta has developed the theme of polymerization as a grandiose fugue. The successful initiation, prosecution, and completion of so much and so varied research is the result of his most unusual originality, drive, and power of sustained work."

In telling of the parallel, and yet contrasting, scientific careers of Natta and Ziegler, Sir Robert went on to say "Natta was, and is, essentially a physical chemist who used organic chemical substrates. His contributions have been made largely by studies of reaction kinetics and of molecular structures by means of X-rays and electron diffraction. Using such methods, he has been able to expand our knowledge of catalysts and polymerization in a truly dramatic manner."

Natta and Cis-Polybutadiene

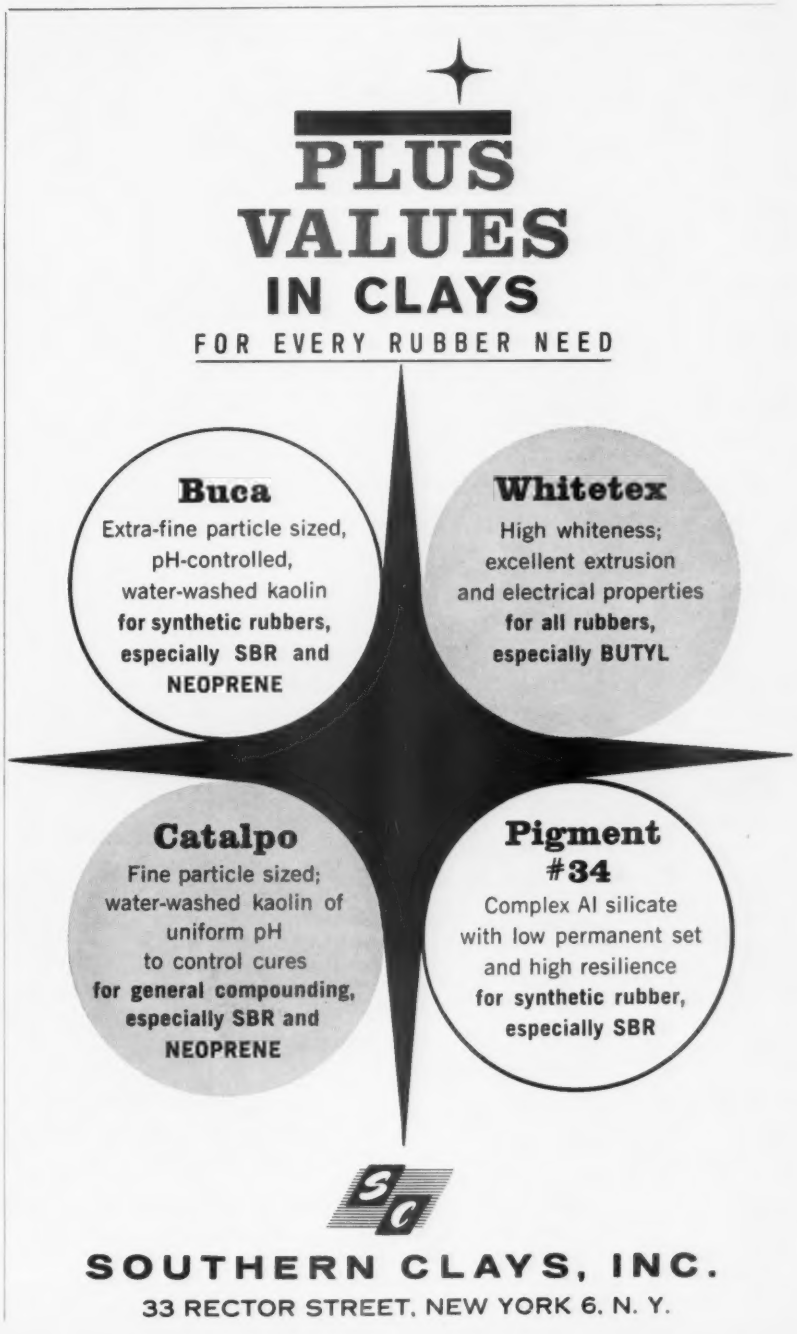
Referring to *cis*-polybutadiene, Sir Robert declared that Natta had made it become crystalline on stretching in the cold. "The disentangling of patents in this field would be splendid grist to the lawyers' mill, but there was no question of the value of Natta's contribution."

Dealing with recent developments, Sir Robert referred to ethylene-propylene copolymers and then said, "This year in Montreal, Natta contributed a paper on the use of olefins in general, with the double bond in other than the α position, in polymerization processes. Again a novel break, which is still too early to assess."

The medalist, Dr. Giulio Natta, was born in 1903 and took his doctorate in chemical engineering in 1924. This was followed by the Libero Docente of the Politecnico, Milan, three years later. His first chair of general chemistry was at the University of Pavia from 1933 to 1935, followed by that of physical chemistry at the University of Rome until 1937, and of industrial chemistry at the Politecnico in Turin. In 1938 he returned to the Institute of Industrial Chemistry at Milan, and is now the director of that Institute.

BFG Builds Jet Tire

► B. F. Goodrich Co., Akron, Ohio, has developed a new tire said to be capable of serving the 2,000 mile-an-hour B-70 aircraft. Described by Goodrich as a, "major advancement in the state of the tire-making art", the tire was developed to withstand the tremendous heats, loads and speeds of supersonic aircraft. New concepts in tire carcass construction enabled designers to pack more strength into the tire per pound of tire weight.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Financial News

Seiberling

► Nine Months: Net loss of $397,663, against a net profit of $143,633 in the first nine months of the preceding year. Sales for the first three quarters of the current year amounted to $35,402,716, down 5.8 per cent from the $37,589,082 recorded in the same period of 1960. The net loss shown in the first nine months of this year is attributed to expenses incurred in closing down a "high cost" shoe products plant in Carey, Ohio.

Thiokol

► Nine months ended September 30: Net earnings were $3,684,290, or 78c each on the average of 4,714,005 shares outstanding. This represented an increase of 38c over the net income of $2,633,006, or 57c a share in the 1960 period. Net sales increased to $132,986,068 from $124,429,898 in the first nine months of 1960.

Columbian Carbon

► Nine months: Net earnings were $5,399,000 or $3.33 a share, an increase over the nine months earnings of 1960 which amounted to $5,344,000, or $3.31 a share. Net sales for the first nine months of 1961 were $62,959,000 as compared with $61,375,000 in the like period in 1960.

Armstrong Rubber

► Nine months ended September 30: Net income before taxes amounted to $9,577,829, equal to $2.85 a share, compared to the like period in 1960 of $9,714,987, or $2.91 a share. Net sales for the nine month period amounted to $119,388,888, compared with $116,784,382 for the first nine months of 1960.

General Tire

► Nine Months ended August 31: Net profits of $18,061,334, or $3.20 a share, compared with 1960 figures of $16,272,431, or $2.90 a share. Sales climbed to $563,936,813 for the nine months compared with $535,428,022 in a like period in 1960.

B. F. Goodrich

► Nine months: Net income was $23,077,760, or $2.52 a share, compared with $24,121,747, or $2.68 a share, for the first nine months of 1960. Net sales for the first nine months of 1961 were $559,690,620, compared with $587,602,200 for the same period in 1960.

Clevite

► Nine months: Net earnings were $3,431,971, or $1.75 a share, compared with $5,109,985, or $2.75 a share, in the first nine months of 1960. Sales for the first nine months of 1961 were $67,777,288, compared with $73,097,662, for the first nine months of 1960.

Universal Oil Products

► Nine months: Net earnings jumped to $2,067,801, or 70c a share, from $1,124,740, or 39c a share, in the corresponding period last year. Sales in the first nine months of 1961 rose to $72,178,323 from $43,347,249 in the like period of 1960.

U.S. Rubber Reclaiming

► Nine months: Net income was $387,182, or 87c a share, compared with a figure of $129,320, or 29c a share, in the like period in 1960. Sales were up for the nine month period this year to $5,511,138, compared with last year's ninth month figure of $3,937,786.

Brunswick

► Nine months ended September 30: Net earnings were $34,268,929, or $1.95 a share, from $28,462,101, or $1.65 a share, for the like period of 1960. Net sales rose to $332,623,633 for the first nine months of 1961, from $315,306,075, in 1960's first nine months.

Allen Industries

► First half: Net income amounted to $732, 041, equal to 91c per share, compared with $930,581, or $1.16 per share, for the comparable period a year ago. Net sales totaled $19,483,723, against $24,486,132 for the first half of 1960.

Witco

► Nine months ended September 30, 1961: Net income was reported at $2,492,800, or $1.64 a share, as compared to a 1960 period figure of $2,508,200, or $1.66 a share. Sales for the nine months were $76,965,600 compared with $74,541,100 for a similar period in 1960.

U.S. Rubber

► Nine months: Net income fell off to $20,138,035, or $2.82 a share, from $25,490,427, or $3.76 a share for the same period in 1960. Sales in the nine month period of 1961 sagged to $699,744,607 from $739,624,625 for the similar period last year.

Minnesota Mining

► First half: Earnings reached $34,315,129, equal to 67c per share, compared with $32,366,002, or 63c for the same period last year. Sales totaled $290,714, 358, against $263,013,173 for the first six months of 1960.

Pierce & Stevens

► First half: Net income was $301,814, equal to 46c per share, compared with $328,727, or 51c per share, for the first half of 1960. Sales totaled $4,174,887, against $4,450,945 for the corresponding period a year ago.

Garlock

► First half: Net income was $137,300, equal to 27c per share, compared with $780,970, or $1.54 per share, for the first half of 1960. Sales totaled $15,194,729, against $16,632,414 for the corresponding period a year ago.

Monsanto

► Nine Months: Net earnings were $50,132,000 or $1.83 a share, from $53,736,000 or $1.98 a share, in the 1960 period. Net sales increased to $695,014,000 in 1961 against a 1960 figure of $678,998,000.

Parke, Davis

► First half: Net earnings came to $9,425,323, equal to 63c per share, compared with $15,130,626, or $1.02 per share, for the like period a year earlier. Sales amounted to $90,152,831, against $99,045,616 for the first six months of 1960.

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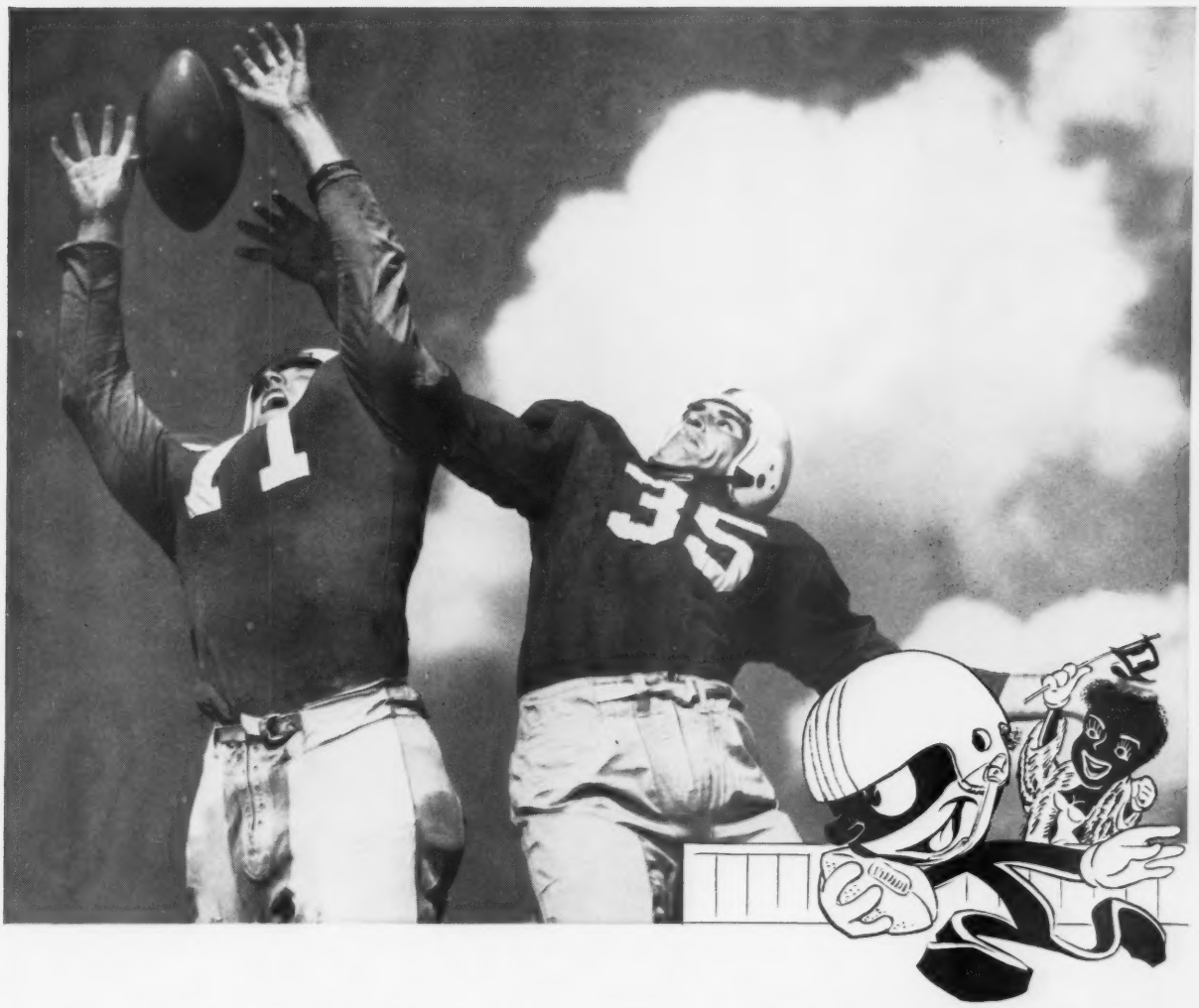

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Distributors of Phillips Chemical Company Products, 80 Broadway, New York 5, N.Y.

West Coast News

► Featured speaker at the technical session of the dinner meeting held on November 7 by the Los Angeles Rubber Group at the Biltmore Hotel in Los Angeles, Calif., was Paul F. Bertsch (DuPont). The meeting was attended by 106 members and guests. The speaker presented a paper entitled "A New Technique for Analyzing Compounding Data", a paper he had previously presented at a recent meeting of the Detroit Rubber & Plastics Group. An abstract of this paper will be found in the May, 1961 issue of RUBBER AGE. The dinner meeting on November 7 was addressed by Fred Haney, general manager of the new Los Angeles Angels baseball team of the American League.

► General Tire & Rubber Co. has expanded its West Coast manufacturing facilities with the establishment of a urethane foam fabricating plant at Montebello, Calif., according to Oliver G. Vinnedge, vice-president and director. John J. Philbin, who has been director of Polyfoam sales on the West Coast, will be in charge of the new plant. With this new plant, General Tire will now have six manufacturing operations on the West Coast.

► Goodyear Tire & Rubber Co., Western Region, Los Angeles, Calif., has announced the appointment of Leonard J. Quinn as manager of the Labor department. He succeeds Harry D. Hollinger, who has been transferred to Goodyear International Corp., Akron, Ohio. John J. Tolfree will succeed Mr. Quinn as industrial engineer, the position Mr. Quinn held prior to his new appointment.

► The Presray Corp., a subsidiary of Pawling Rubber Co., Pawling, N. Y., has expanded its Western operations with the opening of a manufacturing plant at Palo Alto Industrial Park, Palo Alto, Calif. The plant will manufacture pneumatic devices. L. Preston Hollander has been named vice-president and general manager of the plant, and will be in charge of Western Division operations for Presray.

► Controlling interest of Western Organic, Inc., Santa Fe Springs, Calif., manufacturers of chlorinated paraffins, paradichlorobenzene, orthodichlorobenzene, hydrochloric acid and other allied chemical products has been purchased by Neville Chemical Co., Pittsburgh, Penna. Lee V. Dauler, president of Neville stated that Western Organic will be operated as a subsidiary of Neville, and that the new aquisition will enable Neville to offer customers better service and a wider spectrum of product lines.

► Ellay Rubber Co., Los Angeles, Calif., has purchased Charles Crowl Co., and Charles Crowl Chemical Co., El Monte, Calif., which will be operated as Ellay Laminates, a division of the parent company. Ellay will continue to supply the Crowl line of press-planished sheets and panels for the aircraft industry, and will also add new products for application in furniture, radiation shielding and building panels.

► Bryson B. Hoff has been named manager of the Los Angeles district office of the Industrial Division, Armstrong Cork Co., succeeding Paul H. Fiebiger who was promoted to district manager of the Defense Division. Mr. Hoff, a 1952 graduate of Lafayette College, joined Armstrong in 1955 after two years of service in the U.S. Army.

► Shelly Urethane, Inc., Los Angeles, Calif., has acquired Midwest Foam Co., Chicago, Ill. It is reported that with the purchase of Midwest, Shelley annual sales will be boosted from a current $2 million annually to $5-6 million a year. Shelley imports urethane from foreign countries, principally Germany.

► Bill Blackman, formerly of Shell Chemical Co., Torrance Calif., has come out of retirement to join Ram Chemical Co., Gardena, Calif.

► Rubber Equipment, Inc., South El Monte, Calif., has announced the purchase of Rubber Machinery Co., of El Monte.

Polymer Group Formed

► A new organization, called the Polymer Group, has been formed in Southern California under the auspices of the Southern California Section of the American Chemical Society. The Polymer Group is made up of persons from all branches of the polymer and plastics fields, but its membership is open to all who are interested. Although several technical societies in the Los Angeles area are active in the polymer field, the founders of the Polymer Group feel that the interests of these older groups lie in special areas, not those visualized for the new organization.

Many functions are foreseen for the new group. Among these are the encouragement of education in polymer science and acting as a clearing house for the exchange of information between other organizations involved with rubber, plastics, etc. An important activity of the Polymer Group will be the arranging of lectures and discussions in areas not covered by current activities of other polymer societies. In addition, the new group is publishing a monthly newsletter called "Tactics."

The officers of the Polymer Group are: *Chairman,* William C. Teach (U.S. Borax Research), and *Secretary-Treasurer,* Anton J. Havlik (CalTech).

Graham Named Manager

► Marcus J. Graham has been appointed manager of the Mojave, Calif., carbon black plant of the United Carbon Co., New York, N.Y. A chemistry and mathematics graduate of West Texas State College, Mr. Graham started his career as a high school teacher, but shifted to industry. His entire industrial career has been with United Carbon. During World War II, he served as superintendent of United Carbon's Ryus, Kansas, plant.

Metal-Filled Silicone

► Furane Plastics Co., Los Angeles, Calif., is offering, on an experimental basis, metal-filled silicone rubbers that can be cured at room temperature. The product lineup is as follows: iron powder-filled silicone (H-1759-Fe); brass powder-filled silicone (H-1759-Br); aluminum powder-filled silicone (H-1759-Al); copper powder-filled silicone (H-1759-Cu); and the catalyst for these systems (H-1759B).

High road or low road . . . fabrics figure as key structural material

On the drawing board: orbiting space stations (top) fold to fit in rocket nose cone, inflate with gas. Astronauts are protected by space suits of special coated fabrics.

In the development stage: fabric fuel tanks (left) can be anchored or towed by submarine for underseas storage. Right: fabric pressurized hemispheres for on-the-bottom mining.

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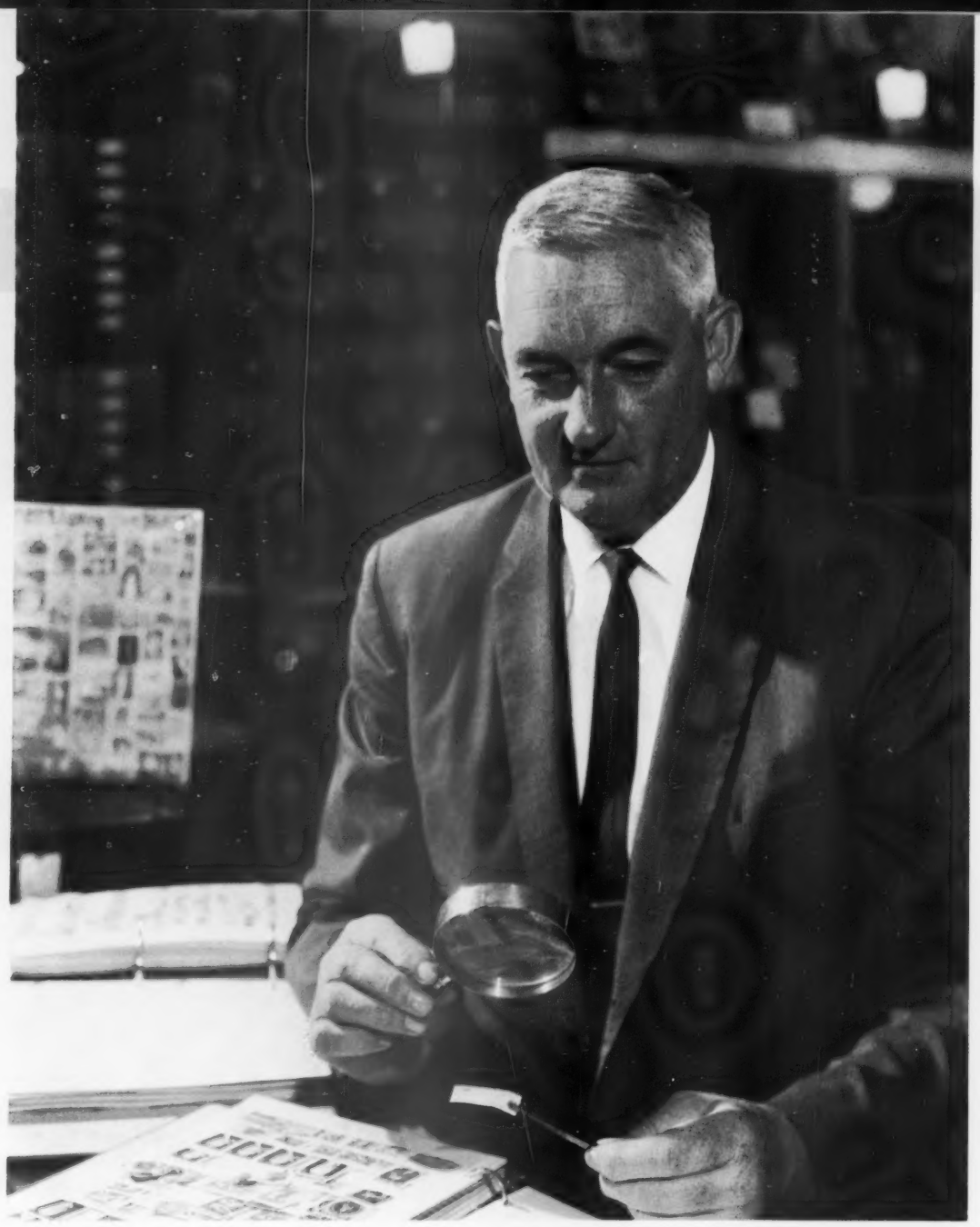

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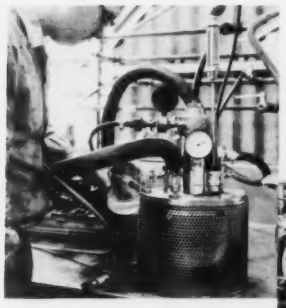
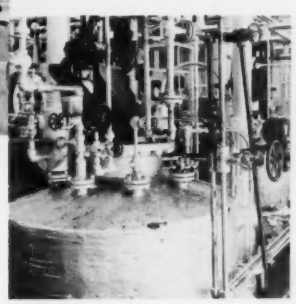
In the United Carbon Research and Development Laboratories a patient search is always in progress for the rare–the as yet unmade black masterbatch which will better serve our customer's need.

THE PATIENT SEARCH



United Carbon takes pride in the development of its new black masterbatches. Top-flight bench-scale and pilot-plant operations help make these new products possible. This small reactor polymerizes test batches of synthetic rubber under closely controlled conditions.



Large intermediate equipment in United Carbon's R & D Pilot Plant confirms research findings and translates them into production items. Highly instrumented reactors similar to this one help in the continuing quest for improved product and process development.

United Carbon keeps a weather eye on present conditions in the rubber industry so that it can forecast tomorrow's needs. This permits a continuing parade of new and better black masterbatches to satisfy your demands.

In its pilot plant at Baytown, United Carbon studies in original equipment design and application have made possible major contributions to the industry. A recent example is the unique United-Barclay process which has improved quality by providing a method of continuous coagulation. It produces uniform, highly dispersed additions of extender oil and solid components in salt-free polymer. This means superior unpigmented SBR rubbers and black masterbatches.

The elaborate pilot operation performs "the patient search" for new and better technology so that tomorrow's masterbatches will be ready when needed. It can provide test samples in quantities from 20 pounds up.

Recently, the Company has spent over half a million dollars modifying and replacing equipment to keep its pilot plant tops in the industry. Today, it serves customers by developing BAYTOWN® brand of black masterbatches into the best products available.

BAYTOWN — The Birthplace of Black Masterbatch

For more information on the entire line of high-quality BAYTOWN black masterbatches, contact:

UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.
A Subsidiary of United Carbon Company
AKRON CHICAGO LOS ANGELES
BOSTON HOUSTON MEMPHIS
In France: UNITED CARBON FRANCE, S.A.

UNITED CARBON

A little girl's most prized possession, this quality product combines sales appeal with the ability to withstand a child's kind of tender, loving care.

Manufactured by Ace Vynl Molding Corporation, N.Y., one of the largest in this field, all parts of this doll are made exclusively from formulations based on BAKELITE Resins.

Says Mr. David Cole, President of Ace, "BAKELITE Vinyl Resin QYKV, used in the head and arms, has given us the excellent color uniformity we require. Its fast gelation rate and high yield make possible even distribution in our high-output molding equipment.

"The excellent air release of the dispersion resin," continues Mr. Cole, "permits us to manufacture plastisols suitable for our rotational casting operation, without vacuum deaeration, even under humid conditions."

Plan now to find out how the complete line of BAKELITE Resins can help you to improve the quality and sales appeal of *your* products. Write Dept. LL-124L, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE PLASTICS

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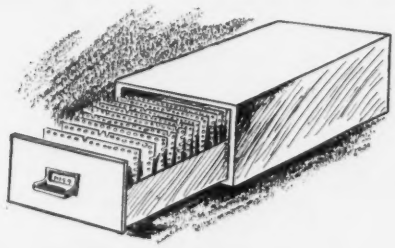

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Published in monthly issues, each issue is furnished to the subscriber in the form of a package of file cards. These cards, containing data on a wide variety of compounds, are provided with marginal notches indexing physical properties, base ingredients, etc. To find one or more compounds with specific properties, you merely insert a sorting needle through the stack of cards. Then take your choice of formulas meeting precise specifications for hardness, elongation, tensile, etc.

Based on the number of compounds published in journals and technical releases during past years, it is expected that the 1961 issues of THE RUBBER FORMULARY will provide subscribers with 1000 or more cards during the year. THE RUBBER FORMULARY for 1954 contained 991 compounds; for 1955, 950 compounds; for 1956, 985 compounds; for 1957, 1,178 compounds; for 1958, 1,236 compounds; for 1959, 1,134 compounds, and for 1960, 1,148 compounds.

THE RUBBER FORMULARY is sold on an annual subscription basis (by calendar year) and is issued monthly. Each month's issue contains compounds published regularly in periodicals and technical releases of suppliers to the rubber industry. Each shipment is accompanied by a table of contents (in loose leaf form) listing the compounds and their sources.

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Canadian News

► Lack of interest by Canadians in the disregard of their democratic rights is not only surprising—it is frightening, Dr. Robert V. Yohe, president of B. F. Goodrich Canada, Ltd., told members of the Canadian Manufacturers' Association at a recent meeting in Hamilton, Ontario. "Events are occurring in Canada which should alert us to the octopus-like dangers of creeping socialism," Dr. Yohe said. He illustrated this reference by citing the "take-over" of B. C. Electric by the province of British Columbia, and the "apathetic reaction" of the Canadian public to this action.

Dr. Yohe questioned whether Canadians are really concerned that a province has absolute authority to seize private property without compensation, and to deny the right of access to courts for redress of injury. He asked, "Will the indifference or dissolving indignation of the unfairness of such acts as the B. C. Electric grab, permit our present way of life to go by default?

"Our free, competitive enterprise system does not belong to business and industry—it belongs to all the people. If people want to be really free, they must make sure that political power and economic power be kept apart," the rubber company president said.

"Whatever the motives of our leaders, however honest they may be, if these powers were to fall into the hands of another political party with less scrupulous intent, all the achievements of 94 years of democratic endeavor since Confederation could well disappear in the thin smoke of a misshapen concept of public interest," Dr. Yohe emphasized.

► Polymer Corp., Ltd., Sarnia, Ontario has started construction of its new 20,000 ton polybutadiene plant, which, when completed in the fall of 1962, will require the addition of 300 employees. The company also announced that its plans to build a butyl rubber plant in the United Kingdom have now been abandoned, and that the firm will look over other sites in Europe where a plant could be constructed.

► An increase in duties on rubber belts and belting has been recommended by the Tariff Board in a report recently submitted to the House of Commons in Ottawa. The purpose of the increase is to protect Canadian producers against United Kingdom imports. Total rubber belting imports increased from an average of $100,000 a year during 1935 to 1954 to $1.6 million annually during 1955 to 1959. The board estimates that 80 per cent of these imports came from the United Kingdom. The increase would have the effect of doubling present protection against United Kingdom imports of conveyor and transmission belting and V-belts.

► What is reportedly Canada's biggest benzene plant, more than doubling the dominion's capacity, has been started up by Imperial Oil, Ltd., at its Sarnia, Ont., refinery. The plant, built at a cost of $5 million, is rated to produce 30 million gallons of benzene a year. Imperial Oil, which is 70 per cent owned by Standard Oil Company (New Jersey), says a portion of the benzene output will be exported, some will be used captively for further petrochemical processing and the balance of the benzene will be sold to Canadian consumers.

► Leo Roth has been named general manager of the Dayton Rubber Co., (Canada) Ltd:. Toronto, Canada. Prior to joining Dayco, Mr. Roth was a development engineer with a major rubber company for six years, and prior to that was assistant technical director of Swan Rubber Co. A native of New York City, Mr. Roth holds a B.S. degree in chemical engineering from the University of Colorado.

► A. G. Spalding & Bros., Inc., has announced establishment of a Commonwealth Division. Operation of the sporting goods maker's Canadian, English and Australian plant will be directed by Albert S. Ballingall, president of A. G. Spalding & Bros. of Canada, Ltd., Brantford, Ontario.

Reclaimers Issue Folder

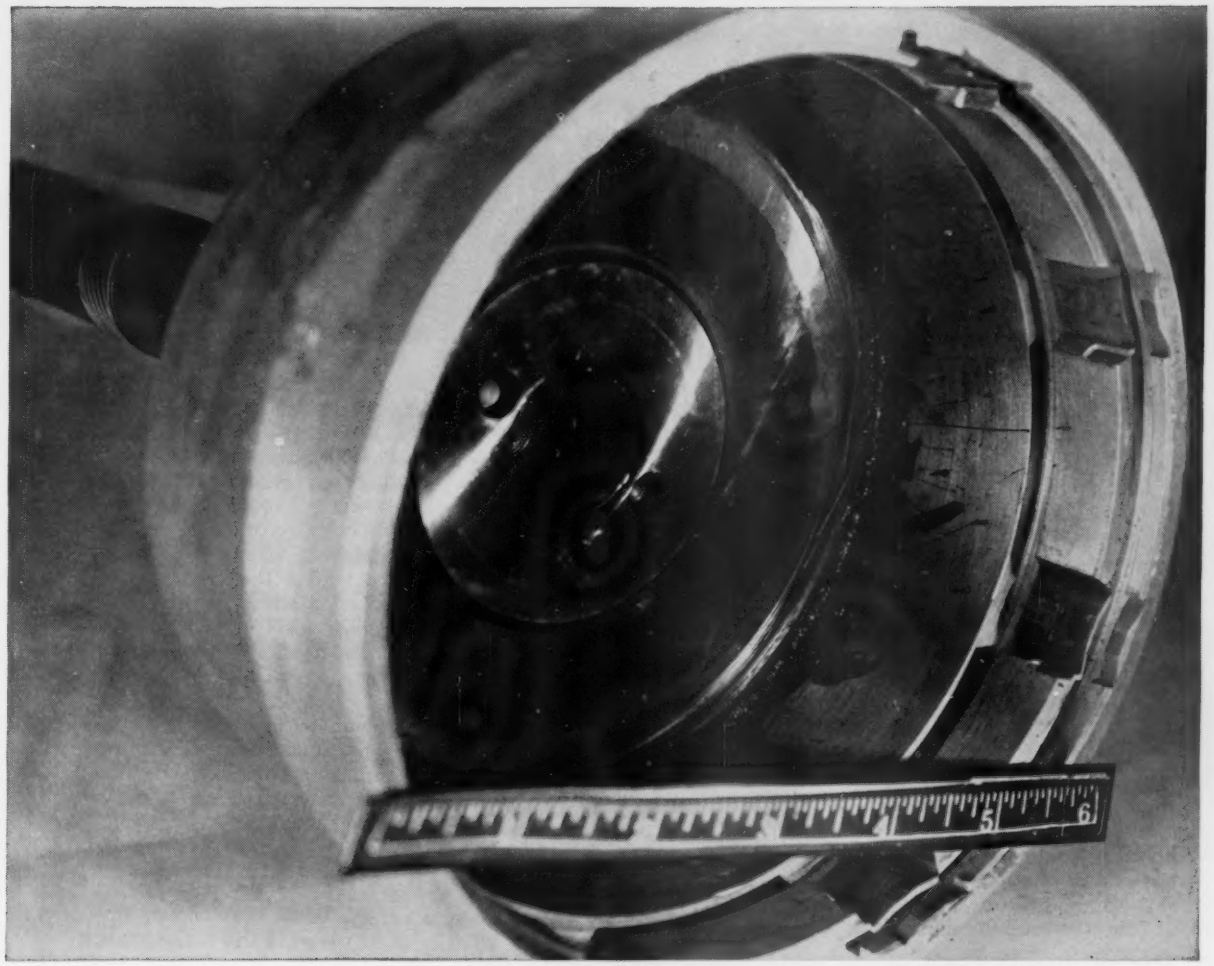
► A six-page folder on the use of reclaimed rubber in tires, inner tubes, and mechanical rubber goods has been issued by the Rubber Reclaimers Association, New York, N.Y. Entitled "Reclaim in Tires and Mechanical Goods", the booklet contains condensations of papers given at the 1961 Spring Meeting of the Akron Rubber Group, which was devoted to a panel discussion on reclaim.

Condensed versions of papers read by Kenneth R. Garvick, development director of Mansfield Tire & Rubber Co., and John E. Brothers, then chief chemist of the Ohio Rubber Co., are contained in the folder. Also included are the opening remarks of Lawrence M. Baker, factory manager of the General Tire & Rubber Co., who served as moderator of the panel discussion, and Donald L. McCollum, production manager of Naugatuck Chemical, who spoke on the history and future of reclaim.

The folder provides practical information on the way the rubber industry uses reclaimed rubber to eliminate or minimize many of today's factory problems. It explains that compounders currently are using reclaim for better processing and faster rate of cure, to reduce mixing time, and lower power costs, as well as for its beneficial effect on dimensional stability and the lower scrap loss that results from its use. The informative folder can be obtained from the Rubber Reclaimers Association, 101 West 31st St., New York 1, N.Y.

Sturge Offers Desiccant

► A new desiccant which reportedly prevents porosity caused by the presence of moisture during the processing of natural and synthetic rubbers, has been introduced by John & E. Sturge, Ltd., Birmingham, England. The desiccant, known as Caloxol C31, is a 3:1 dispersion of calcium oxide in acid-refined mineral oil. It is a thick, odorless paste which can be poured at room temperature and is said to have good storage life without pick-up of atmospheric moisture. In addition, the company states, Caloxol C31 is claimed to be non-scorching when used with a wide range of conventional accelerators, and can be incorporated without difficulty into rubber compounds.



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SEE WHAT RUBBER-BASE ADHESIVE CAN DO?

This is the housing of an automotive torque converter. It's joined to the output shaft by a thin film of thermoset cement.

The converter has just undergone torsional tests that wrecked its mechanical parts—with no effect whatever on the metal-to-metal bond. This bonding job is an achievement of Cycleweld Chemical Products Division of Chrysler Corporation.

A similar cement, made of nitrile rubber and Durez® phenolic resin, cut the cost of assembling an all-aluminum truck tailgate by eliminating 211 rivets and 42 welds.

Other heat-setting cements that marry rubber and phenolic resin show promise for:

- building new strength and quietness into car doors, deck lids, and hoods by edge-bonding instead of tack welding.
- attaching metal trim without drilling holes.
- easy-to-cast aluminum engine heads and intake manifolds, made in *two* sections bonded together with a leakproof, heatproof seal.

If you have a tougher-than-usual bonding problem—or expect to have one—now's the time to see what a rubber-phenolic adhesive can do for you. We'll be glad to put you in touch with people who make such adhesives.

We don't make these adhesives. We just supply some of the basic ingredients—phenolic resins that influence the qualities a good structural adhesive must have. Permanent, rigid set. Controlled tack. Heat resistance. Precise sameness from batch to batch. Good storage stability. Many superstrong adhesives are the result of teamwork between rubber chemists and Durez resin chemists backed by 40 years of experience.

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Obituaries

F. Royal Carey

► F. Royal (Roy) Carey, advertising representative for the Palmerton Publishing Co., New York, N. Y., died suddenly on October 30 at his home in Cowesett, R. I. He was 57

years old. Mr. Carey was born in Woonsocket, R. I., on September 28, 1904. For over 30 years he had represented the Palmerton Publishing Co. in the New England area, selling advertising space in its three publications, RUBBER AGE, RUBBER RED BOOK, and ADHESIVES AGE. Mr. Carey was a member of both the Rhode Island and Boston Rubber Groups. He leaves his wife, two sons, and one grandchild.

Hugh Patrick Campbell

► Hugh Patrick Campbell, a sales representative for the American Cyanamid Co., died on September 21 as the result of an automobile accident. He was 30 years old. A native of Watertown, Conn., Mr. Campbell was a chemical engineering graduate of Boston College. He formerly was associated with the B. F. Goodrich Co. He leaves his wife, six children, a brother, and four sisters.

Fred W. McConky, Jr.

► Fred W. McConky, Jr., former Goodyear Tire & Rubber Co. assistant vice president, died in Ft. Lauderdale, Fla., on October 8. He was 69 years old. A native of Portland, Me., Mr. McConky attended the University of Virginia. He joined Goodyear as a tire salesman in 1919 and was named assistant vice-president in 1952. He retired in 1958 after 39 years with the firm. He leaves his wife, a son, and a brother and sister.

Henri C. Mathey

► Henri C. Mathey, a founder and president of the Passaic Rubber Co., Clifton, N. J., died on November 5 of a heart attack at his home in Maplewood, N. J. He was 86 years of age. Born in Hoboken, N. J., on August 8, 1875, Mr. Mathey was graduated from Stevens Institute of Technology in 1897 and started his career as an automobile designer in Chicago, Ill. He later worked as an engineer for the Western Electric Co., and then joined the Underwriters Laboratories where he served until 1917. He then became assistant superintendent, and later manager, of the Okonite Co.

In 1919 he left Okonite and was co-founder of the Passaic Rubber Co. in Passaic, N. J., a company formed to manufacture rubber and friction tapes. Mr. Mathey is survived by three sons, a daughter, eight grandchildren, and two great-grandchildren.

Carl L. Fenn

► Carl L. Fenn, retired secretary-treasurer of the former Adamson Machine Co. died on September 28 at his home in Akron, Ohio. He was 68 years old. He started his career as a bookkeeper for Adamson Machine Co. now known as Adamson United Co., 46 years ago and retired 15 years ago. Mr. Fenn attended St. Bernard School and Hammel Business College. He leaves his wife, two sons, a daughter, a brother, and 13 grandchildren.

Leonard L. Borrell

► Leonard L. Borrell, a sales engineer for the Anaconda Wire and Cable Co., New York, N. Y., died on September 9 at his home in Yonkers, N. Y. He was 45 years old. Mr. Borrell attended Manhattan College and New York University. He leaves his widow, his mother, four children, a brother, and two sisters.

Huber Forms New Groups

► Three new groups to expand the development of new products and new markets have been formed by the J. M. Huber Corp., New York, N.Y. The new Product Development Group, at Havre de Grace, Md., will be part of the firm's Chemicals Division. The new Market Development and Technical Service Groups will be part of the Industrial Products Department.

The Product Development Group will recommend use research; perform evaluation, research, and survey functions in connection with new products and new uses for modification of existing products; and work with the new Market Development Group on the evaluation and establishment of new markets.

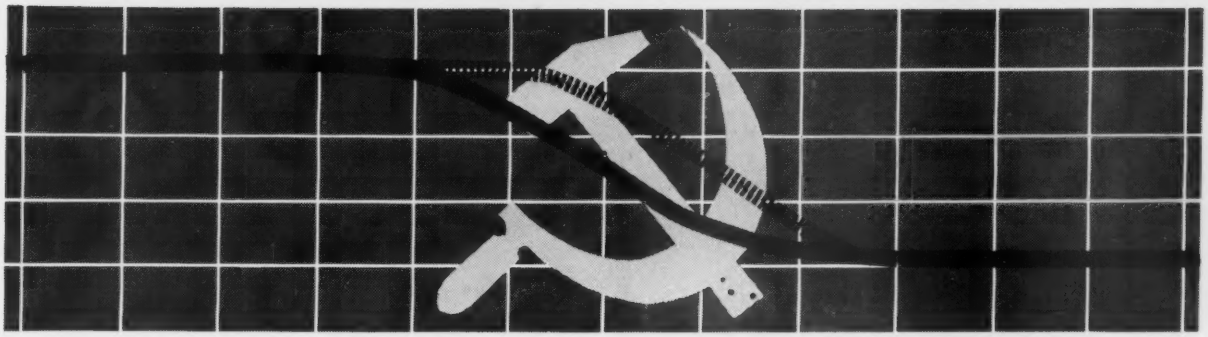
The Market Development Group will develop marketing information, including pricing, packaging, and channels of distribution, for new products. It will also establish contacts for consumer testing and trials.

In addition to preparing technical sales literature, technical training of sales representatives, and providing specialized technical service and contacts with customers, the Technical Service Group will perform some research and study functions.

Acquires Fiber Chemical

► Diamond Alkali Co., Cleveland, Ohio, has acquired Fiber Chemical Corp., Cliffword, N. J., through an exchange of stock. A producer of organic chemicals and inorganic specialties, Fiber Chemical will be operated as a wholly owned subsidiary of Diamond Alkali. A. B. Tillman, general manager, soda products of the Chrome Division of Diamond Alkali, has been elected president of the new subsidiary. G. V. DuPont, special staff assistant at Diamond Alkali, will assume the responsibilities of vice-president, and will be based at the Cliffwood plant. R. H. Armor, formerly controller of Diamond will be secretary-treasurer. F. F. Axelrad, formerly president of Fiber Chemical, has been named director of research and development.

► Fischer & Porter Co., Hatboro, Penna., has issued a 4-page speculation sheet 13C1260 describing its Cable and Drum Levelrator which is especially suitable for liquid level applications involving high temperature, pressure, corrosive liquids and combustible or hazardous vapors.



HOW MUCH DO YOU *REALLY* KNOW ABOUT SOVIET RUBBER TECHNOLOGY?

The Soviet Union has achieved rapid progress in all branches of knowledge since World War II. Although this has been obvious for many years it has been extremely difficult because of the language barrier for those in the Western countries to follow the technical progress being made. This is no longer true where rubber chemistry and technology is involved because cover-to-cover translations of "Kauchuk i Rezina," the most important monthly Russian rubber journal, are available in English under the title of SOVIET RUBBER TECHNOLOGY. The translation work is made financially possible by a grant from the British Department of Scientific and Industrial Research and is carried out by the Rubber and Plastics Research Association of Great Britain.

Let the official Soviet publication keep you informed of Russian technical developments behind the Iron Curtain. Remember that the Russians have no reason to hide anything from their readers for patent or other factors. There are no "company secrets" in the Soviet Union and rarely is comparable information made so readily available in Western journals. Now in its third year, the English translation of "Kauchuk i Rezina" affords you an excellent means of charting Russian activities in all phases of rubber manufacturing—efficient use of raw materials, automation of manufacturing processes, design of tires and industrial rubber goods, and many others. And how else could you secure translations of some 600 pages of Russian for only $50.00 per year!

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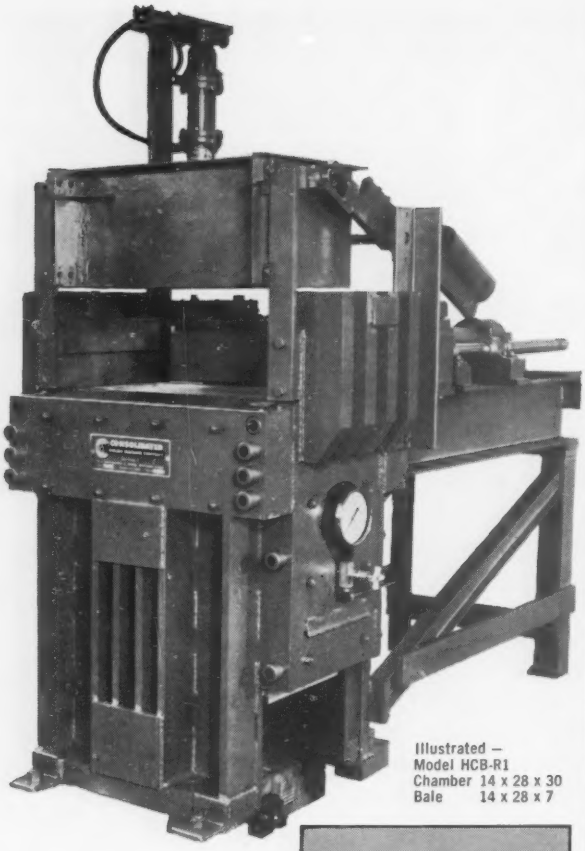
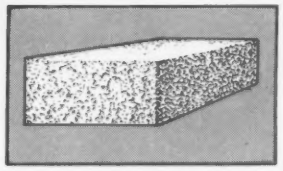


Illustrated —
Model HCB-R1
Chamber 14 x 28 x 30
Bale 14 x 28 x 7



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New Goods

Colored Rubber Bands

► Inch-wide colored rubber bands, large enough to wrap around a school girl's books, act as a head band, or even circle her waist have been introduced by B. F. Goodrich Industrial Products Co.,

Akron, Ohio. The new bands come in eight colors: red, blue, white, green, grey, black, yellow and orange. Another use foreseen for the colored bands is in gift wrapping as a whole or partial replacement for colored ribbon. The advantage of using rubber bands, according to the manufacturer, is that they can be removed without cutting, and re-used.

Disogrin Packings

► A complete line of urethane hydraulic seals and packings has been introduced in the United States by Disogrin Industries, Mount Vernon, N. Y. Made of Disogrin, the company's urethane elastomer, the hydraulic components have a high tensile strength of over 5000 psi at break which enables them to withstand pressures of 3000 to 10,000 psi and higher with no back-up rings. A key design feature of the seals is an especially developed chamfered sealing lip. This design offers important advantages: immediate and leak proof sealing, even at very low pressures, and simple assembly of seal bearing components into the housing without requiring any special tools or fixtures. Disogrin seals and packings can operate efficiently over a wide variety of temperatures, ranging from —40 to 225 degrees F.

BOOKS for the RUBBER INDUSTRY

MICROSCOPY OF RUBBER

by C. H. Leigh-Dugmore $4.50

Although the electron microscope was developed barely 30 years ago, it has been applied to the study of rubber structure since 1940. The value of microscopy, however, depends as much on the experience of the microscopist in interpreting what he sees as on his ability to prepare specimens and operate his microscopes. This book helps the microscopist by showing him where and how to look for the needed experience. It covers all types of elastomers.

ANALYSIS OF RUBBER

by W. C. Wake $8.00

The first modern work devoted solely to this important subject to be published in English. In addition to an analysis of natural and synthetic rubbers, the author deals with polyethylene, polyvinyl chloride, polyvinyl alcohol and the polyurethanes. The identification of compounding ingredients used in these polymers is discussed. This work will unquestionably become a standard and is a "must" for all those concerned with the analysis of rubber polymers.

ENGINEERING DESIGN WITH RUBBER

by A. R. Payne and J. B. Scott $8.00

Among the most important works of its kind, this book covers (among others) the following subjects: The Rubberlike State, Dynamic and Related Time-Dependent Properties of Rubber, Dynamic and Related Test Methods and Machines, Force-Deformation Relationships in Rubber Units, Resonance and Transmissibility, Practical Design Details, Use of Rubber in Engineering, Collaboration Between the Engineer and the Rubber Technologist.

CONDUCTIVE RUBBER

by R. H. Norman $3.50

This book covers the production, application and test methods of and for conductive rubber. It surveys a whole mass of results and presents the main conclusions in a form which can readily be used by the rubber manufacturer. It deals extensively with the conductive and anti-static classes of rubber. The effects of time, stress and other variables on resistivity are covered. A complete index is provided. One of the practical RABRM manuals.

Please send me the following books:

- ☐ Microscopy of Rubber, $4.50
- ☐ Analysis of Rubber and Rubberlike Materials, $8.00
- ☐ Engineering Design with Rubber, $8.00
- ☐ Conductive Rubber: Its Production, Application and Test Methods, $3.50

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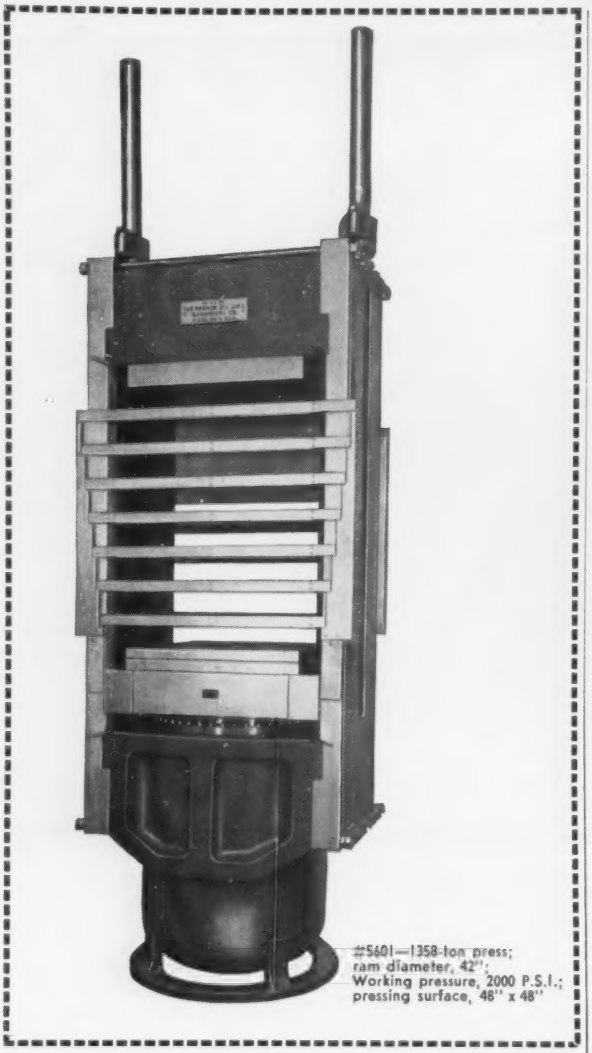

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This press, used in making closed cell vinyl and rubber sponge, is a typical example of French precision manufacture to meet special molding requirements. Whatever your molding needs may be, you can depend on French for a rubber molding press that will do the job most efficiently, with minimum down time. Write, outlining your needs, and you will receive full information promptly.

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1000 Greene St., Piqua, Ohio

Low Stretch V-Belt

► A high traction, low stretch V-belt, developed by B. F. Goodrich Industrial Products Co., Akron, Ohio, links the powered axle of a truck to the unpowered axle, transforming the free rolling wheel into a driven wheel, with all the advantages

of a tandem drive differential but at a reported fraction of the cost. The belt rides snugly between dual tires, firmly gripping the V-shaped grooves of special sheaves on which it glides. The new belt is being marketed through Dayton (Sterkel) Tandem V-Belt Drive Co., Denver, Colo. Advantages claimed for the V-belt include: better traction in all weather conditions; smoother, safer, more uniform power and brakes; safer downhill traction; improved tire mileage, and smoother driving.

R-M Ribbed Conveyor Belt

► A practical ribbed conveyor belt designed to carry up inclines wet, slippery or soupy materials, such as a mixture of gravel and water, has been developed by the Manhattan Rubber Division, Raybestos - Manhattan, Inc., Passaic, N. J. The chevron shape ribs or cleats prevent the wet materials or water from running back even when on an incline since the cleats form pockets that trap the water and hold the material. The belt can be reversed so that water will drain out of the mixture if desired.

Reeves Vinyl-Glass Cloth

► The Vulvan Division of Reeves Brothers, Inc., New York, N. Y., has introduced Coverlight-V a new line of vinyl coated glass cloth which finds use in high temperature applications in aircraft construction, welding curtains, and in other industrial and maintenance fields. The material is available in widths of 30 and 50 inches and in weights ranging from 5 to 20 ounces. The company states that the light-weight material is specially treated for fire resistance and flexibility.

POLYSAR BUTYL 600

A new high level of unsaturation

In new Polysar* Butyl 600 Polymer Corporation has achieved a much higher level of unsaturation than has been available previously in butyl rubbers.

The increase in cure rate, the higher state of cure and the improvements in heat aging and compression set which Polysar Butyl 600 gives are particularly advantageous in such applications as automotive accessories, machine and motor mounts, dock fenders, bridge bearing pads, rail pads, electrical insulation, high pressure steam hose and conveyor belting.

Write for Technical Report No. 9: 12A to: Marketing Division, Polymer Corporation Limited, Sarnia, Canada.

*Trade Mark Reg'd.

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Polymer Corporation

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developed

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...a new

high unsaturation rubber,

to give you

- Faster cure rate
- Lower compression set
- Better low temperature properties
- Improved aging resistance
- Greater resistance to surface tack development in outdoor weathering and in heat-treated tread-type compounds
- Lower heat build-up
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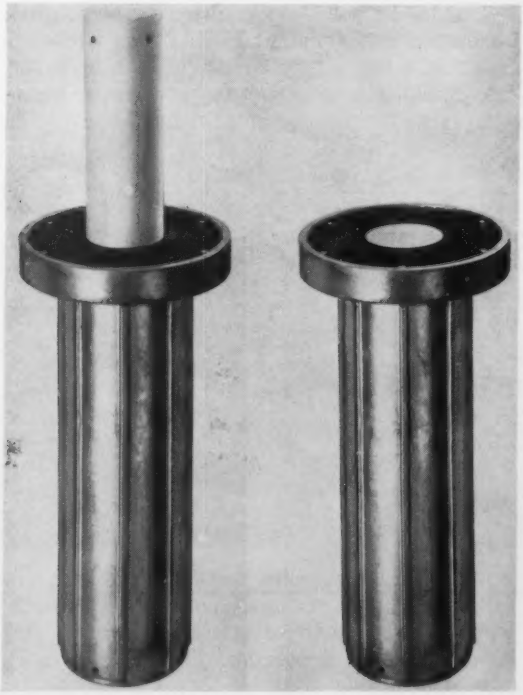
Rubber Traffic Markers

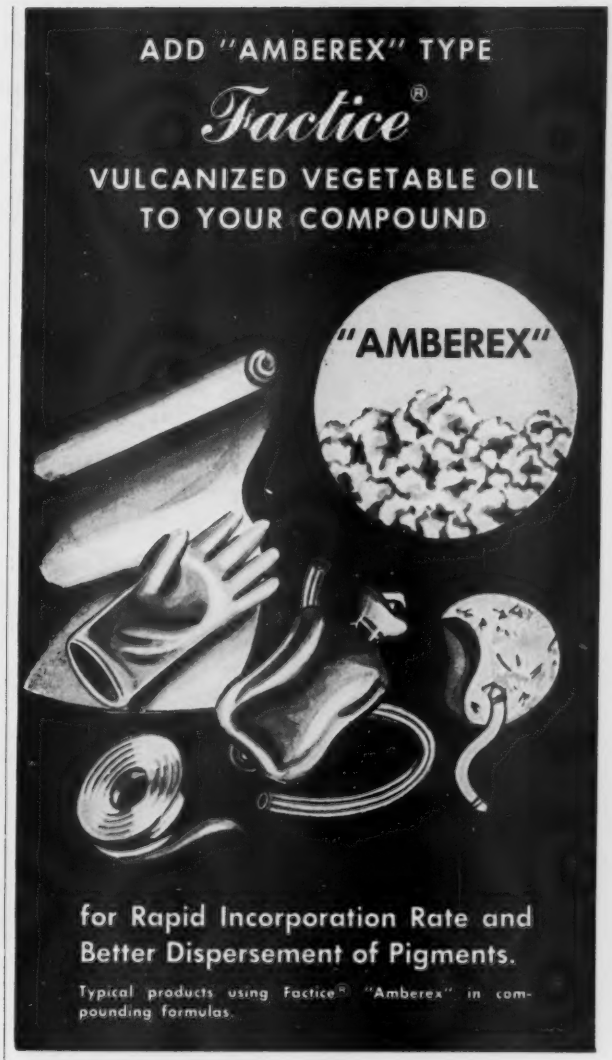
► A new internally-illuminated automatic-rising traffic marker and control system that makes it possible to change traffic patterns and safety at desired intervals without direct labor or the usual hazards of manual distribution and collection, has



been put on the market by Nationwide Traffic Engineering Corp., Glenside, Penna. Called Movatron, the system is engineered complete for installation. Movatron is available with either non-illuminated markers or internally illuminated markers made of a translucent silicone rubber produced by General Electric which resists weather, heat, color fading, and sunlight. Results from extensive testing show the markers to remain undamaged by tire impact up to 60 miles per hour. The silicone rubber markers are fabricated by the Stalwart Rubber Co., Bedford, Ohio.

Tuf-Line Hose

► Tuf-Line Tank and Truck Car Hose for chemicals, food and abrasive material handling has been developed by Acme-Hamilton Manufacturing Corp., Trenton, N.J. Tuf-Line hose has a tough abrasion resistant neoprene cover, and will withstand sunlight and constant exposure to spillage. Fabric reinforced throughout, its tough, resilient plastic cord spiral reinforcement adds to its durability. Kinking is eliminated due to special construction. Tuf-Line is crushproof and will return to its original shape after being accidentally run over.



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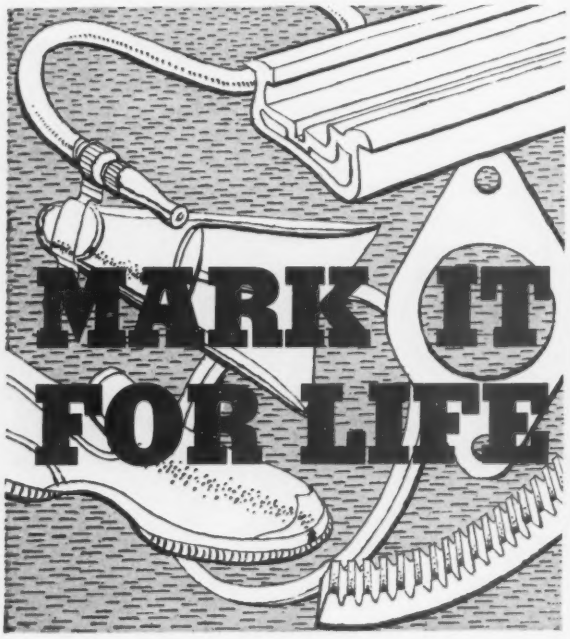

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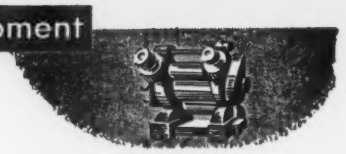
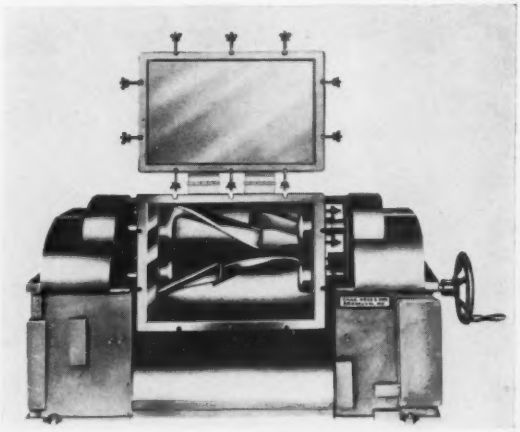


Double Arm Kneaders

► Charles Ross & Son Co., Brooklyn, N.Y., has announced a new line of Double Arm Kneaders featuring vacuum tight covers, built-in hydraulic trough tilting device, one to one ratio of horse-



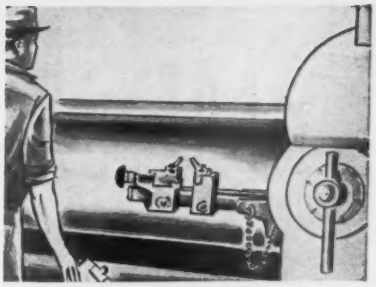
power to gallon capacity, and additional advances in design. These new machines are built specifically for intensive kneading and mixing of heaviest types of plastic masses and compounds. Heavy cast steel mixing arms are uniformly driven by gears on both ends for even load distribution, and mixing arms operate in heavy duty, self-aligning roller bearings. The machines are offered in sizes of from one pint to 150 gallons working capacity.

McNeil Tire Press

► The 40 inch Bag-O-Matic passenger tire press developed by McNeil Machine & Engineering Co., Akron, Ohio is said to have an operating cycle of 51 to 54 seconds, with positive, accurate tire positioning and handling, wide curing size range with simple adjustments and maximum production with minimum maintenance. In addition, completely new unloader arms move under cured tires to carry them upward and out the rear of the Bag-O-Matic. Tires are supported under both sides and across the rear of the sidewalls. The new Jet-Ejector eliminates the need for an elaborate vacuum system. The water-operated Venturi unit creates vacuum as required for rapid bladder drainage and positive bladder folding for subsequent automatic loading. McNeil Load Indicating Gauges accurately measure the elongation of the side links as the machine goes on squeeze. Gauges show the exact pressure on the individual molds, the company states.

Accurate, Cleaner-Cut Strips...

with new fold-away GOODMAN MILL STRIP CUTTER



Don't be satisfied with hit-or-miss dimensions, rough, beveled edges, on your stock stripping. The GOODMAN MILL STRIP CUTTER is specially designed for precision requirements of stock feeding to another mill, extruder or lay up machine. A built-in micrometer knob assures exact width control, from 1" to 12". Models without micrometer and 3 blade assemblies for cutting two strips are available, too. Toolsteel blades are locked securely in place, and are easily sharpened. For *maximum safety*, unit swings up, holding blades against mill frame out of operator's way. Models available for mounting on right or left frames, for 24" to 84" two roll mills. *Write today for illustrated bulletin.*

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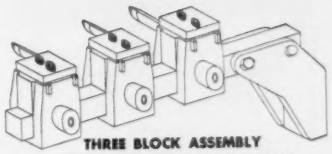

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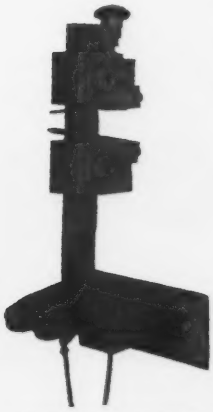
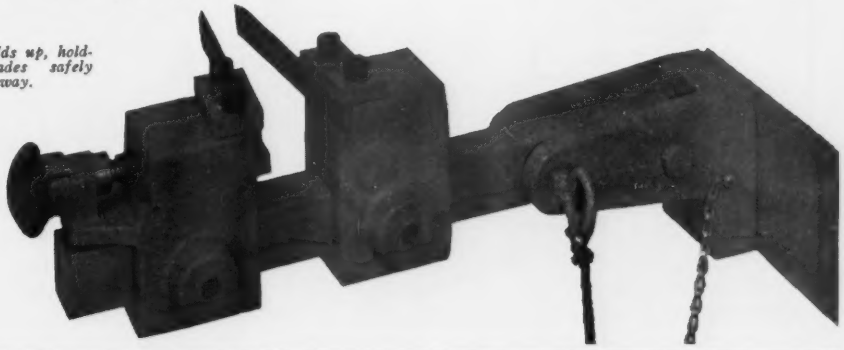


Unit folds up, holding blades safely out of way.



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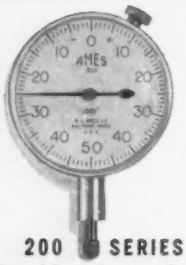

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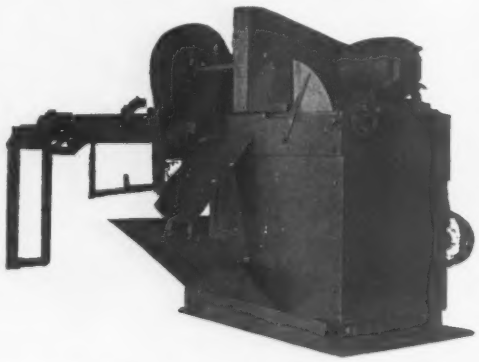

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Micro Hardness Tester

► The Model H-5 Micro Hardness Tester recently introduced by Testing Machines, Inc., Mineola, N.Y. features a visual as well as an audible signal to follow the micro-movement of an indentor into the part being tested. The test duplicates established dead load hardness testers

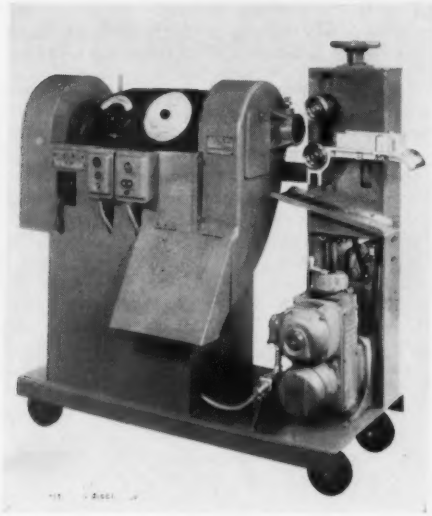
for rubber but under micro proportions. Thin films of rubber, small molded pieces, O-rings, and experimental fragments can be evaluated in numbers, which agree with the Shore "A" Scale ASTM D-676 and International Rubber Hardness Degrees ASTM D-1415. For O-rings, thin seals, and irregularly shaped parts, it is said to provide tests not obtainable by other methods. It will give accurate readings on specimens less than ½ MM (.01969 inches) thick. The machine has an indentor and a frictionless means of applying a minor and major load. The depth of indentation is sensed electronically. By taking a series of readings at convenient time intervals a graph relating indentation and recovery to time can be obtained. The firm's Model H-6 is somewhat more sensitive and better suited for rigid plastics and for measuring the state of cure of synthetic resins and fiber reinforced material. Model H-7 is more sensitive than the other two and is said to be excellent for measurement of extremely thin surface coatings.

Holmes Molding Press

► A molding press said to be easily adaptable to a wide variety of work in both rubber and plastic molding has been developed by the Stanley H. Holmes Co., Chicago, Ill. Both transfer and compression molds can be used on the unit, called Hydro-Moldic Production Molding Press, and molds can be changed quickly, according to the manufacturer. In addition, present molds can easily be adapted for use in the Hydro-Moldic. A straight hydraulic action provides continuous full pressure during the entire closing stroke. The press is available in such standard sizes as: 20 by 20 inches, 24 by 24 inches, and 32 by 32 inches.

Slug Length Calculator

► An electric Slug Length Calculator is a built-in feature of the newest model Slug Cutter, Model 3-12, by G. F. Goodman & Son, Philadelphia, Penna. The 3-12 delivers slugs up to 3 inches in



diameter and 12 inches long, at a rate of from 50 to 1200 per minute. Set up for cutting stock as it is extruded, coiling and stocking time is eliminated. Extreme accuracy of weight and tolerance is assured, the company states. The Slug Length Calculator quickly and easily computes correct cutter speed from feed rate and slug length desired, while using one or more blades.

Portable Ozone Recorders

► New O3R Series Portable Recorders, developed by Ozone Research & Equipment Corp., Phoenix, Ariz., provide standard ozone concentration measurement ranges as low as 0-15 pphm/volume and up to 0-120 pphm/volume. Instruments operate on a continuous three day schedule. O3R series can be used for atmospheric or ozone test chamber recording of ozone concentrations. The accuracy is three per cent of operating scale, the weight is 31 pounds, and the power requirement is 95 watts at 110 volts AC.

► Teflon strips compounded with pulverized fiber are finding use as a replacement for bronze bushing strips on rubber bailers. Called Fluorogreen strips, they are available from John L. Doré Co., Houston, Texas.

► Featuring high-speed automatic cycling with positive repeating action, a high precision centerless grinder, Model CG-12-A has been made available by Royal Master Grinders, Inc., 272 Highway 23, Riverdale, N. J.

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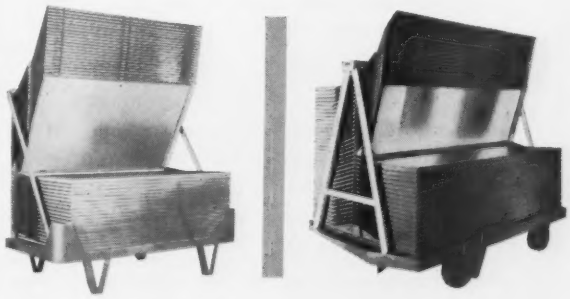

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Quality Control in the Rubber Industry

by

Simon Collier and Edward A. Reynolds

36 pp. 8½ x 11 in. $2.50

A new booklet designed to help the technical executive better understand and use new concepts in quality control, its organization and techniques. Originally published as a five-part article in the February through June, 1961 issues of RUBBER AGE, this booklet now makes available in one handy source all the material and data which has attracted so much industry attention.

Part I — Introduction.

Part II — Functions, Organization and Personnel. Information as to the responsibilities of other company departments and details as to the quality control organization and the training, direction and evaluation of personnel.

Part III — Statistics. Statistical methods, including routine control, experimentation, trouble shooting, evaluation and effective use for economical maintenance of product quality.

Part IV — Records, Reports and Data Handling. The need for records, the various types, and some methods for their simplification. Samples of different records and comments on QC graphs, files and data retrieval.

Part V — Engineering Aspects. Problems of specifications; visual standards, sorting inspections; automatic process controls, and non-destructive laboratory and life testing techniques.

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Reviews

Progress in Dielectrics. Vol. II. Edited by J. B. Birks and J. H. Schulman. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6¼ x 9¾ in. 225 pp. $9.50.

This is the second in a planned annual series of volumes surveying the present state of knowledge in selected specific areas within the scope of the main subject. This volume is typical of the series in that it contains a number of papers, each presented by an acknowledged expert in his particular field, regardless of the country in which the author is working. The six papers presented here cover (1) Theory of Polarization and Absorption in Dielectrics: An Introductory Survey, by G. Wyllie, (2) Dielectric Properties of Polymeric Systems, by A. J. Curtis, (3) Irradiated Polymers, by R. M. Black and A. Charlesby, (4) The Dielectric Properties of Glass, by P. M. Sutton, (5) High-Permittivity Ceramics for Capacitors, by K. W. Plessner and R. West, and (6) Artificial Dielectrics, by J. Brown.

As can be perceived from this listing, the scope of the book crosses substantive fields, but has as a main "theme" dielectric properties in weak electric fields. The second aim of the volume (and the series), apart from that mentioned above, is to provide a meeting point for all who encounter problems of dielectrics in their work, including, beside physicists and electrical engineers, rubber and plastics chemists and technicians, and others doing work in the whole range of the newer materials.

The initial surveying chapter discusses energy in dielectrics, linear behavior, mechanical models, static models, general theory, the crystalline state, mechanisms of dielectric loss, and some of the recent developments.

The second paper, on properties of polymeric systems, is largely restricted to a discussion of dielectric properties as they are related to molecular and intermolecular structures. It specifically subordinates reports of work directed toward finding of suitable materials for manufacture of insulation, for instance, or reports of measurements on special materials of unknown origin, those insufficiently characterizable, or ones of a composite nature, such as laminates.

"Progress in Dielectrics, Vol. II" will be of value to the researcher specifically concerned with the subject, but less so to the technician searching for the solution to a particular problem.

•

Scandinavian Research Guide. Published by Scandinavian Council for Applied Research, Gaustadalleen 30, Blindern, Norway. In two volumes. 6 x 9 in. Approximately 700 pages in each. Softbound $10.00.

This Guide is a remarkable collection of information, unique in its comprehensive coverage of who is doing what, where, in science and technology in the five Scandinavian countries: Denmark, Finland, Iceland, Norway, and Sweden. More unusual is the fact that the Guide is directed to the outside world. The decision to publish it in English, as opposed to one of the Scandinavian languages, was made with this in mind.

The aim of the two-volume set is, in the words of the secretary-general of SCAR, to further cooperation between institutions and persons engaged in scientific and technical research. It is also intended as a source of information for industrial firms, and trade organizations interested in making research contacts.

The compilation of over 1,500 research organizations

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within science and technology (but excluding life sciences) gives practically complete information about each institution: the name, address, telephone number, the head or officiating officer, the size of the group, a brief summary of its activities, policies concerning contracts for research, and its publications, if any.

A superb classification system makes it simple to find the names of institutions or persons involved in a specific field.

The set is divided into seven sections. Volume I contains a complete list of research institutes and laboratories arranged by Universal Decimal System into categories. Rubber, for instance, is listed under High Polymers, including plastics and rubber; two research institutes are listed. One, a small plastics laboratory with three scientists, is working in the fields of reinforced plastics, shrinkage in injection molding of plastics, and techniques for injection molding of polyamides (nylon). A second laboratory, with 15 workers, is specializing in sponsored research for the organic chemical industry, and for the plastics, rubber, paint, and adhesive industries. The last mentioned work involves chemical and physical investigations of high polymer materials, fillers and other additives, materials testing, and development of forming and finishing operations.

The remaining six sections, in Volume II, group together in the same fashion Central Research Organizations, Universities and Institutes of Technology, Scientific Societies and Their Publications, Central Scientific and Technical Libraries and Information Services, Productivity Centers, and a Bibliography.

As can be seen from the above, the Guide is superbly organized and cross-indexed, and a model of convenience as a tool.

BOOKLETS, CATALOGS, etc.

Polysulfide Crude Rubber. (Bulletin CR-13.) Thiokol Chemical Corp., 780 North Clinton Ave., Trenton 7, N. J. 8½ x 11 in. 12 pp.

This study evaluates five new oil furnace carbon blacks as reinforcing fillers with Thiokol FA and ST polysulfide rubbers, and indicates the improvements which can be obtained in the vulcanized rubbers' physical properties. The bulletin contains test results in tables and graphs which compare the properties of FA and ST polysulfide rubber compounds containing each of the new oil furnace blacks and SRF black. In addition to tensile properties and tear resistance, the evaluation includes the effects on hardness and extrusion characteristics of the oil furnace blacks alone and in blends with SRF black.

•

Around the Plastics and Rubber World of A. Schulman, Inc. A. Schulman, Inc., 790 East Tallmadge Ave., Akron, Ohio. 11 x 11 in. 36 pp.

The purpose of this illustrated brochure is to acquaint the industry with the company's personnel, facilities and operations. A brief history of the company's growth serves as an introduction to a pictorial tour and description of its Akron Research Center, and its plants in Akron, Bellevue, and Dorset, Ohio; East St. Louis, Ill.; and Orange, Texas. The folder describes its latest product, Konvex Tie Pad, a device for increasing the life of railroad ties, as well as the products which the firm represents. Also included is a listing of the key personnel in its U. S. sales offices, New York City export-import office, and overseas branches.

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- Production of synthetic rubber in the United States and Overseas
- Consumption of natural and synthetic rubber
- Consumption and stocks of reclaimed rubber
- Prices of natural, synthetic and reclaimed rubber
- Imports of natural rubber in the U.S. and U.K.

You will find all these—and far more—in every single issue of the

RUBBER STATISTICAL BULLETIN

Issued monthly, the RUBBER STATISTICAL BULLETIN is published by the Secretariat of the International Rubber Study Group in London, England. This group is the international organization established to collect statistical and other general information on rubber. Regular statistics are furnished by the numerous governments cooperating in the program, with the result that the figures published are the nearest approach to world-wide official figures.

Each issue of the BULLETIN is replete with up-to-the-minute data on the production, consumption, exports, imports and stocks of rubber. Some 60 separate tables are used to enable the subscriber to locate specific statistical information on practically any phase of the rubber market. Constant revisions are made in the tables and the tabular data to provide more detailed information. A quick ten-year picture is given in almost every instance.

As an added service, the Secretariat also makes available the RUBBER NEWS SHEET. Published between issues of the Rubber Statistical Bulletin it serves as an interim report and is especially important to those concerned with the rapidly changing market developments in rubber.

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Rubber Statistical Bulletin . . . . $8.50 per year

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

The price of spot rubber on the New York Commodity Exchange moved in a range of 100 points since our last report (November 1), high for the period being 28.00c reached on the first day of the month, and low being 27.00c reached on November 8, four trading days later. The average price of spot rubber for the month of November was 27.46c based on 20 trading days. This compares with an average of 29.28c in the previous month.

As we went to press last month the market had not yet reacted fully to the change in policy of the Government's General Services Administration. This change had been in the offing, but was officially announced on November 1. The effect was electric. Trade sources described the Singapore market as "in a state of shock."

Spokesmen from Merrill Lynch, Pierce, Fenner and Smith comment that the policy has aroused the whole Asiatic producing area. The U.S. has been accused of attempts to wreck delicately-balanced economies, and all major producing areas asked the G.S.A. to reconsider its decision to sell up to 5,000 tons per month of rubber regardless of world price.

The Malayan Minister of Commerce and Industry assailed the program as a move to keep the price of natural at an unnaturally low level, and tantamount to economic aggression against underdeveloped countries.

Official Comment

The State Department, which was silent at first, stood firm despite these protests, and reports that the 5,000 ton figure would be reduced to 2,000 tons. As it developed, all the producing countries and trade associations had been contacted by the G.S.A. prior to the public announcement of the decision, and the program was reported to have met with their approval. A frequently heard comment was that the amount of rubber involved is small and will be spread over a long period, so that world markets will not be disrupted.

Ceylon met the announcement with official pessimism, and shortly thereafter restricted the amount of new acreage that can be devoted to rubber, and introducing a new tariff, the effect of which is to reduce the export duty, thus giving a slightly greater margin with which planters there can work.

On the New York Commodity Exchange, spot rubber prices reached new 1961 lows, and sentiment is such that no reversal of the decline is anticipated before some time next year. Prices are now at the lowest level since May 1958.

Encouraging news from the automobile industry, of interest to the tire market, has been completely ignored. Trade sources predict that new cars will have their best year since 1955, and tire sales have finally picked up in response to this.

NEW YORK, DECEMBER 1, 1961

Price Data

Closing Rubber Prices on New York Commodity Exchange

NOVEMBER 1 TO NOVEMBER 30

Nov.	Spot	Jan.	March	May	Sales
1	28.00	27.80	27.70	27.50	43
2	27.62	27.25	27.20	27.05	9
3	27.75	27.65	27.50	27.45	13
4	....	....	....	....	..
5	....	....	....	....	..
6	27.50	27.50	27.45	27.35	2
7	....	....	....	....	..
8	27.00	26.90	26.85	26.80	3
9	27.38	27.20	27.20	27.20	0
10	27.25	27.10	27.05	27.00	31
11	....	....	....	....	..
12	....	....	....	....	..
13	27.38	27.55	27.31	27.30	12
14	27.38	27.25	27.15	27.15	13
15	27.50	27.60	27.40	27.35	1
16	27.75	28.00	27.65	27.60	5
17	27.75	27.70	27.55	27.50	19
18	....	....	....	....	..
19	....	....	....	....	..
20	27.50	27.55	27.35	27.35	5
21	27.50	27.60	27.45	27.45	5
22	27.50	27.60	27.55	27.45	16
23	....	....	....	....	..
24	27.38	27.35	27.20	27.20	16
25	....	....	....	....	..
26	....	....	....	....	..
27	27.25	27.35	27.15	27.10	1
28	27.12	27.15	27.10	27.05	16
29	27.38	27.47	27.40	27.32	34
30	27.38	27.45	27.35	27.30	11

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.27 3/8
Jan.	.27 3/8
Apr.-June	.27 3/8
Thin Latex Crepe:	
Spot	.30 1/2
Thin Brown Crepe, No. 2	.26 5/8
Flat Bark Crepe	.22

London Market
(Standard Smoked Sheets)

Jan.	26.37 — 26.66
Mar.	26.66 — 26.79

Singapore Market
(Standard Smoked Sheets)

Jan.	24.85 — 24.93

Middling Upland Quotations

	Oct. 31	Nov. 30		
	Close	High	Low	Close
Dec.	34.63	33.70	33.55	33.61
Mar.	35.38	34.77	34.56	34.66
May	35.71	35.21	35.09	35.15

Notes & Quotes

If U.S. businessmen employed the same initiative and drive in foreign markets as they use in their domestic business, the United States could outsell any competitors in the world, according to L. F. McCollum, chairman of the Export Expansion Committee of the U.S. Department of Commerce. The speaker, who is also president of Continental Oil Co., made the statement at an Import-Export Trade Conference recently held in Portland, Ore.

Synthetic Rubber

The impact of the new stereospecific rubbers has been felt by the natural rubber producing countries and by those in the natural rubber market in consuming countries. As recorded in the comments in the column on the left, the decision by the G.S.A. to change its stockpile disposal policy has had international repercussions. It follows on the heels of a similar shift in policy, noted last month, by the British in the disposal of their stockpile.

While G.S.A. announcement made no official mention of the stereospecific rubber potential, a ranking State Department official did. Chester Bowles, U.S. Undersecretary of State, in commenting on the U.S. policy shift, advised rubber producing countries to keep their prices low, to discourage further expansion of synthetic rubber plants in the U.S., and other countries, according to dispatches from Kuala Lampur, where he spoke. His statement came at a time when U.S. consumption of synthetic rubber represents 70 per cent of its total rubber consumption.

His statement also made explicit what industry sources have been maintaining privately: that the U.S. should increase its disposal of natural no matter what happens to world prices. These spokesmen believe that much of the U.S. investment (it cost nearly ¾ of a billion dollars when purchased) will be wiped out by steadily falling prices over the next years.

Synthetic Impact

And this, of course, can be directly attributed to the impact of the synthetics, particularly the stereospecifics.

Among others who have recognized this fact is the chairman of the Anglo-Asian Rubber Plantations, who commented recently that "With the advent of the new stereo types of synthetic rubber, natural rubber producers fully realize . . . the natural rubber industry will have to be even more competitive in both price and quality." His statement came by way of explaining the future prospects of natural rubber, at an annual meeting of the Plantations company.

The London *Times* reported editorially, that though the fall in natural prices has come suddenly, it has seemed to them that it has been inevitable for at least a year, and one of the means by which the natural product is being enabled to become more fully competitive with synthetic. The price of the most widely used grades of synthetic rubber in London is now almost identical to the price of natural.

The pressure of synthetic competitions, they state, has stiffened as surplus production capacity develops. And more and more countries which have previously relied on U.S. or Canadian exports of synthetic rubber are expanding their own plants. Several European countries, with Italy the leader, have recently become net exporters.

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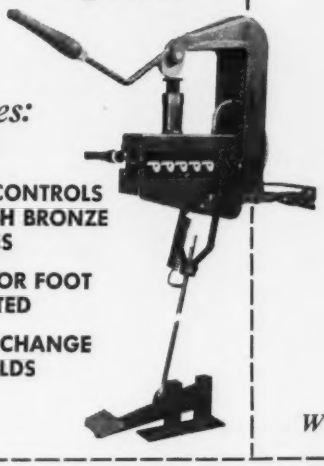
Gasket Splicer



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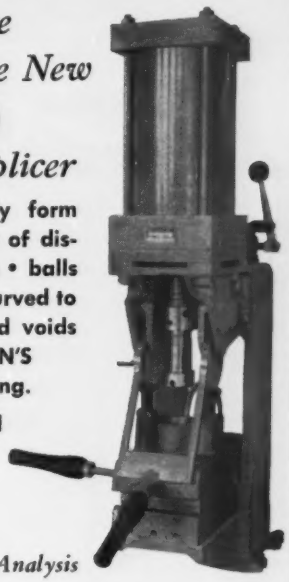

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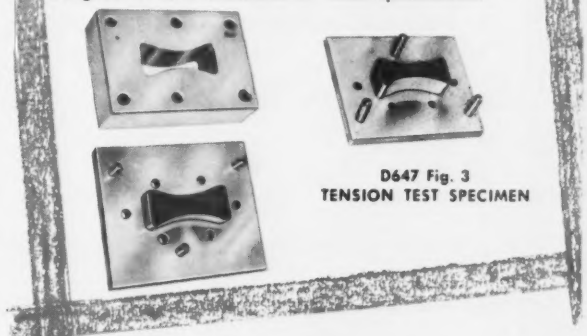

D647 Fig. 3
TENSION TEST SPECIMEN

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Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900	1
Butaprene NH	.6500	1
Butaprene NL	.5000	1
Butaprene NXM	.5800	1
Chemigum N3NS and N5	.5800	3
Chemigum N6	.5000	3
Chemigum N6B	.5000	3
Chemigum N7	.5000	3
Chemigum N8	.5000	3
Chemigum N600	.5000	3
Herecol N-33	.6800	3
Hycar 1001 and 1041	.5800	3
Hycar 1002	.5000	3
Hycar 1014	.6000	3
Hycar 1042 and 1043	.5000	3
Hycar 1051	.5800	3
Hycar 1052	.5000	3
Hycar 1053	.5000	3
Hycar 1072	.6400	3
Hycar 1203	.4600	3
Hycar 1312	.5000	3
Hycar 1411	.6200	3
Hycar 1432	.5900	3
Hycar 1441	.6200	3
Paracril AJ	.4850	3
Paracril B	.5000	3
Paracril BJ	.5000	3
Paracril BLT and BJLT	.5000	3
Paracril C and CLT	.5800	3
Paracril CV	.6300	3
Paracril D	.6500	3
Paracril 18-80	.6000	3
Paracril OZO	.4600	3
Polysar Krynac 800	.5000	3
Polysar Krynac 801 and 805	.5800	3
Polysar Krynac 802	.5000	3
Polysar Krynac 803 and 804	.5000	3

Butadiene-Styrene Types

Ameripol 1002	.2435	3
Ameripol 1006	.2410	3
Ameripol 1006 (crumb)	.2475	3
Ameripol 1007	.2410	3
Ameripol 1009	.2475	3
Ameripol 1009 (crumb)	.2590	3
Ameripol 1011	.2475	3
Ameripol 1012	.2425	3
Ameripol 1012 (crumb)	.2490	3
Ameripol 1013	.2410	3
Ameripol 1013 (crumb)	.2615	3
Ameripol 1500 and 1501	.2410	3
Ameripol 1502	.2410	3
Ameripol 1509 and 1511	.2410	3
Ameripol 1000 and 1001	.2410	3
Ameripol 1605	.1900	3
Ameripol 1606	.1820	3
Ameripol 1608	.1845	3
Ameripol 1609	.2080	3
Ameripol 1610	.1870	3
Ameripol 1703	.2060	3
Ameripol 1705	.2035	3
Ameripol 1707	.1910	3
Ameripol 1708	.1910	3
Ameripol 1710	.1885	3
Ameripol 1712	.1885	3
Ameripol 1805	.1550	3
Ameripol 1808	.1480	3
Ameripol 1809	.1545	3
Ameripol 1810	.1400	3
Ameripol 4600 and 4601	.2410	3
Ameripol 4604	.2410	3
Ameripol 4651	.1770	3
Ameripol 4659	.1820	3
Ameripol 4660	.1870	3
Ameripol 4664	.1845	3
Ameripol 4667	.2080	3
Ameripol 4700	.1750	3
Ameripol 4756	.1545	3
Ameripol 4758	.1450	3
Ameripol 4759	.1598	3
Ameripol 4760	.1576	3
Ameripol 4761	.1710	3
ASRC 1000	.2410	3
ASRC 1001 and 1004	.2410	3
ASRC 1006	.2410	3
ASRC 1009	.2475	3
ASRC 1018	.2700	3
ASRC 1019	.2650	3
ASRC 1500 and 1502	.2410	3
ASRC 1503	.2625	3
ASRC 1703	.2060	3
ASRC 1708	.1910	3
ASRC 1712	.1885	3
ASRC 1713	.1750	3
ASRC 3105 and 3106	.2410	3
ASRC 3110	.2600	3
B-123	.1820	3
Baytown B-134	.1900	3
Baytown 1600	.1930	3
Baytown 1601	.1930	3
Baytown 1602	.1930	3
Baytown 1603A	.1960	3
Baytown 1605A	.1900	3
Baytown 1606	.1820	3
Baytown 1608	.1845	3
Baytown 1609	.2080	3
Baytown 1801	.1760	3
Baytown 1803A	.1740	3
Baytown 1805A	.1550	3
Baytown 1808	.1480	3
Baytown 1811	.1569	3
Baytown 1813	.1640	3
Baytown 1815	.1496	3
Baytown 1816	.1580	3
Baytown 8600	.2410	3
Baytown 8676	.1876	3
Baytown 8679	.2022	3
Baytown 8681	.1835	3
Baytown 8682	.1890	3
Baytown 8700	.1885	3
Baytown 8775	.1545	3
Baytown 8776	.1679	3
Baytown 8781	.1655	3
Baytown 8782	.1583	3
Baytown 8783	.1515	3
Baytown 8784	.1598	3
C-102 (Shell)	.2300	3
Carbomix 1606	.1820	3
Carbomix 1608	.1845	3
Carbomix 1609	.2080	3
Carbomix 1808	.1480	3
Carbomix 1809	.1545	3
Carbomix 1811	.1569	3
Carbomix 1813	.1640	3
Carbomix 1814	.1545	3
Carbomix 1815	.1496	3
Carbomix 1817	.1715	3
Carbomix 3761	.1576	3
Carbomix 3764	.1685	3
CB-102 (Shell)	.1850	3
Copo 1006	.2410	3
Copo 1500	.2410	3
Copo 1502	.2410	3
Copo 1505-NS	.2610	3
Copo 1507	.2410	3
Copo 1510	.2410	3
Copo 1712	.1885	3
Copo 1713	.1750	3
Copo 1714	.1725	3
Copo 1778	.1910	3
FR-S 146	.2300	4
FR-S 158	.2590	4
FR-S 173	.1950	4
FR-S 178	.1800	4
FR-S 181	.2300	4
FR-S 182	.2300	4
FR-S 184	.1775	4
FR-S 189	.2300	4
FR-S 201	.1750	4
FR-S 206	.2300	4
FR-S 211	.2300	4
FR-S 213	.1725	4
FR-S 1000	.2300	4
FR-S 1001	.2300	4
FR-S 1004	.2300	4
FR-S 1006	.2300	4
FR-S 1009	.2365	4
FR-S 1010	.2300	4
FR-S 1012	.2315	4
FR-S 1013	.2300	4
FR-S 1014	.2700	4
FR-S 1500	.2300	4
FR-S 1502	.2300	4
FR-S 1703	.1950	4
FR-S 1710	.1775	4
FR-S 1712	.1775	4
Gentro 1500	.2410	3
Gentro 1712	.1885	3
Gentro-Jet 9152	.2080	3
Gentro-Jet 9153	.1820	3
Gentro-Jet 9154	.1845	3
Gentro-Jet 9250	.1580	3
Gentro-Jet 9251	.1640	3
Gentro-Jet 9252	.1670	3
Gentro-Jet 9275	.1500	3
Naugapol 1015	.3500	3
Naugapol 1016	.2650	3
Naugapol 1018	.2550	3
Naugapol 1019	.2410	3
Naugapol 1022	.3050	3
Naugapol 1023	.3300	3
Naugapol 1503	.2410	3
Naugapol 1504	.3500	3
Naugapol 6003	.2410	3
Naugapol 6100	.3200	3
OB-102 (Shell)	.1825	3
OB-104 (Shell)	.1475	3
OB-106 (Shell)	.1510	3
OB-110 (Shell)	.1410	3
OB-111 (Shell)	.1540	3
OB-113C (Shell)	.1750	3
OB-114C (Shell)	.1420	3
OB-116 (Shell)	.1810	3
Philprene 1000	.2300	4
Philprene 1006	.2300	4
Philprene 1009	.2365	4
Philprene 1018	.2440	4
Philprene 1019	.2300	4
Philprene 1500	.2300	4
Philprene 1502	.2300	4
Philprene 1503	.2300	4
Philprene 1512	.2300	4
Philprene 1703	.1950	4
Philprene 1708	.1800	4
Philprene 1712	.1775	4
Philprene 1714	.1700	4
Philprene 6632	.2300	4
Philprene 6700	.1750	4
Plioflex 1006	.2300	4
Plioflex 1019	.2300	4
Plioflex 1500C	.2300	4
Plioflex 1502	.2300	4
Plioflex 1503	.2300	4
Plioflex 1508	.2300	4
Plioflex 1510	.2300	4
Plioflex 1708	.1800	4
Plioflex 1712C	.1775	4
Plioflex 1713	.1750	4
Plioflex 1714C	.1700	4
Plioflex 1715	.1750	4
Plioflex 1773	.1950	4
Plioflex 1778	.1800	4
Plioflex 1900	.2590	4
Plioflex 1901	.2590	4
Plioflex 1950	.2340	4
Polysar Kryflex 200	.2510	3
Polysar Kryflex 202	.2535	3
Polysar Kryflex 252	.2700	3
Polysar Krylene, NS and 602	.2410	3
Polysar Krynol 651 and 653	.1885	3
Polysar Krynol 652 and 654	.1910	3
Polysar Krynol 655	.1885	3
Polysar S and S-630	.2410	3
Polysar SS-250	.2875	3
Polysar S-X370	.2475	3
Polysar S-X371	.2550	3
S-1000	.2410	3
S-1006	.2410	3
S-1009	.2475	3
S-1011	.2475	3
S-1013	.2410	3
S-1024	.2410	3
S-1500	.2410	3
S-1502	.2410	3
S-1509	.2410	3
S-1600	.1825	2
S-1602	.1825	2
S-1604	.1825	2
S-1605	.1800	2
S-1607	.1750	2
S-1608	.1790	2
S-1703	.2060	3
S-1707	.1910	3
S-1709	.1885	3
S-1712	.1885	3
S-1778	.1910	3
S-1800	.1475	2
S-1802	.1410	2
S-1803	.1650	2
S-1806	.1510	2
S-1807	.1540	2
S-1808	.1420	2
S-1813	.1580	2
S-1814	.1490	2
S-1815	.1440	2
S-7501	.2410	3
S-7652	.1960	3
S-7702	.1750	3
S-7758	.1565	2
SP-102	.2700	3
SP-103	.2700	3
Synpol 1000 and 1001	.2410	3
Synpol 1002	.2435	3
Synpol 1006	.2410	3
Synpol 1007	.2410	3
Synpol 1009	.2475	3
Synpol 1012	.2425	3
Synpol 1013	.2410	3
Synpol 1061 and 1500	.2410	3
Synpol 1502	.2410	3
Synpol 1551	.2410	3
Synpol 1703	.2060	3
Synpol 1707 and 1708	.1910	3
Synpol 1712	.1885	3
Synpol 8103	.2401	3
Synpol 8151	.1820	3
Synpol 8152	.1860	3
Synpol 8200	.1910	3
Synpol 8201	.1750	3
Synpol 8202	.1725	3
Synpol 8208	.1750	3
Synpol 8255	.1480	3
Synpol 8253	.1584	3
Synpol 8254	.1545	3
Synpol 8266	.1598	3
Synpol 8267	.1640	3

SYNTHETIC RUBBER POLYMERS

Butyl Rubbers

Enjay Butyl 035 and 150	.2300 [3]
Enjay Butyl 165 NS	.2400 [3]
Enjay Butyl 215 and 217	.2300 [3]
Enjay Butyl 218	.2300 [3]
Enjay Butyl 268 NS	.2400 [3]
Enjay Butyl 325	.2300 [3]
Enjay Butyl 365 NS	.2400 [3]
Enjay Butyl 10-65 and 10-66	.3000 [3]
Enjay Butyl 10-67	.3000 [3]
Polysar Butyl 100 and 200	.2300 [4]
Polysar Butyl 101	.2775 [4]
Polysar Butyl 300 and 301	.2300 [4]
Polysar Butyl 400	.2300 [4]
Polysar Butyl 402, 450	.2400 [4]
Polysar Butyl 600	.2750 [4]

Chlorosulfonated Polyethylene

Hypalon 20	.4700 [3]
Hypalon 30	.6000 [3]
Hypalon 40	.5000 [3]

Fluoroelastomers

Fluorel	$10.25 [4]
Kel-F 3700 and 5500	$16.00 [2]
Viton A and A-HV	$10.00 [3]
Viton B	$10.00 [3]

Isoprene Rubber

Shell 305	.2300 [2]
Shell 307	.2400 [2]
Shell 500	.1950 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [3]
Neoprene Type AD	.5500 [3]
Neoprene Type FB	.6500 [3]
Neoprene Type GN	.4100 [3]
Neoprene Type GN-A	.4100 [3]
Neoprene Type GRT	.4200 [3]
Neoprene Type KNR	.7500 [*]
Neoprene Type S	.4200 [3]
Neoprene Type W	.3900 [3]
Neoprene Type WB	.4100 [3]
Neoprene Type WHV	.3700 [3]
Neoprene Type WRT	.4500 [3]
Neoprene Type WX	.4100 [3]

Polyacrylate Rubber

Thiacril 36	1.340 [3]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.6000 [3]
Thiokol Type FA	.7400 [3]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.17 [3]
GE Silicone Gum (not compounded)	3.68 [3]
Silastic (compounded)	2.50 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Polysar Latex XPRD-845	.4900 [3]
Tylac 640 and 650	.4500 [1]
Tylac 750	.4900 [1]
Tylac 850	.5300 [1]
Tylac 1640 and 1650	.5400 [1]
Tylac 2430	.5000 [1]
Tylac 2830	.4500 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2750 [3]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.3000 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [5]
FR-S 174	.2950 [3]
FR-S 176	.2775 [5]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000 and 2001	.2750 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [4]
Naugatex 2105 and 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174-F	.3200 [1]
Naugatex J-8855	.3000 [1]
Naugatex J-9049	.2750 [1]
Naugatex J-9064	.3050 [1]
Pliolite 2000 and 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105 and 2107	.3200 [3]
Pliolite 2108	.3000 [3]
Polysar Latex IV	.2775 [3]
Polysar Latex 722	.3200 [3]
Polysar Latex 723	.3200 [3]
Polysar Latex 741	.3000 [3]
Polysar Latex 781	.6750 [3]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]
Tylac 405, 430, 450A	.2750 [3]
Tylac 410	.2900 [3]
Tylac 1705	.3200 [3]
Tylac 1757	.3000 [3]
Tylac 3040 and 3340	.3200 [3]
Tylac 3410-A	.2750 [3]
Tylac 3500-L	.2950 [3]
Tylac 3540	.3200 [3]

Butyl

Butyl Latex 80-21	.3500 [3]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3500[3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [4]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. (4) Freight equalized. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

Looking for rubber technical journals in

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See page 673 of the *new*, 1962 RUBBER RED BOOK for the names and addresses of technical publications all over the world.

MARKETS

(continued)

Reclaimed Rubber

With the prospect of a strong car year ahead, natural and synthetic rubber prospects are favorable, and this also seems to be true of reclaim. The initial indicators are good. Production figures for October, 1961, as reported by the Rubber Manufacturers' Association, are up from September figures by around 15 per cent. October production is reported at 23,350 long tons, as against 20,594 for September.

Although part of this raise may be seasonal, the outlook would appear to be brighter.

The ten month total production figure for 1961 is reported by the R.M.A. at 219,387 long tons, still off from the 1960 total production figure for the same time period of 250,149 long tons.

Consumption during the first ten months of 1960 totalled 235,917 long tons. The 1961 total for the same period is 206,310 long tons.

(Prices for All Areas Except West Coast)
(Average price, carload quantities, minimum freight allowed)

	per lb.
First Line Whole Tire	.11½
First Line Whole Tire Stainless	.12¼
Second Line Whole Tire	.11
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.10¼
Black Carcass	.15¾
Peelings	.11½
Butyl Tube	.16
Natural Rubber Black Tube	.17
Natural Rubber Red Tube	.21
Mechanical, Light Color, Low Gravity	.26
Mechanical, Light Color, Medium Gravity	.20

Scrap Rubber

Scrap rubber activity is moving at steady levels, as dealers reported continuing activity through the past month. In the New York area, best demand seemed centered on synthetic butyl tubes, at price levels which have remained unchanged. Scrap consumption continues to run a bit higher than last year.

The Rubber Manufacturer's Association reports that October consumption was 20,557 long tons and the ten month consumption total is 202,326 long tons. Total stocks at the end of the month were 72,133 long tons, according to the group.

The U.S. Department of Commerce reports that scrap rubber exports for August amounted to 1,425 long tons with Spain, the major destination, absorbing nearly half this total.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.07
No. 1 peelings	ton	38.00
No. 2 peelings	ton	27.00
No. 3 peelings	ton	20.00
Buffings	ton	14.00
Truck and Bus S.A.G.	ton	17.50
Passenger S.A.G.	ton	17.50
Natural Rubber Red Tubes	lb.	.08
Natural Rubber Black Tubes	lb.	.06¼
Butyl Rubber Tubes	lb.	.07½

Tire Fabrics

American Enka Corp. has announced a shift in its entire production of rayon tire yarn to an improved type of Tyrex called "Enka 5000." Starting only two weeks ago, the firm reported that all shipments to the tire industry would be in this new yarn.

The company reports that its own tests, confirmed by large scale use by individual tire companies, show substantial improvements in both the strength and fatigue resistance of cord produced from Enka 5000.

The new product is described by the company as reaching the highest levels of quality ever achieved by the firm, and comes, they state, as a result of research both in the United States and in Europe. The material has been developed, partly with an eye on the 2-ply tire market, which, it is reported, will achieve more than 50 per cent of new 1962 cars.

In other industrial tire-fabric developments, DuPont has announced an expansion in Argentina designed to replace its experimental plant already in production. It will be the first commercial-scale domestic production of nylon tire yarn in Argentina. Tire manufacturers there have been using locally produced cotton and rayon, imported rayon tire fabric, and small quantities of imported nylon tire fabric, DuPont reports. Their Argentine affiliate, making the nylon tire fabric, also produces rayon tire yarn.

In Japan, an arrangement for the production of Nylon 6 tire cord has been announced by Nippon Rayon Co., and Van Kohorn International Corp. of the U.S.

Statistics

Production of tire cord and fabric (excluding chafer and similar fabrics) in the first half of 1961 amounted to 177 million pounds, approximately 17 per cent below the 1960 total for the similar period.

Of this first-half 1961 total, rayon cord and fabric output declined by 25 per cent to 101 million pounds, while nylon was off to 74 million, or a drop of 4 per cent. Cotton cord and fabric production continued at the nominal rate of 2 million pounds for both periods.

In the third quarter just completed (July-September) yarn shipments for tires and related uses were up, totalling 55,000,000 pounds, an increase of 20 per cent over the second period.

(Prices f.o.b. Shipping Points)

Rayon Tire Cord

1100	lb.	.57
1650	lb.	.51
2200	lb.	.50

Nylon Tire Cord

840	lb.	.92
1680	lb.	.92

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: The Rubber Manufacturers' Association reports that in the first ten months of the current year, a total of 34,800 long tons of natural rubber latex were imported into the United States, and 35,292 long tons were consumed. This compares with 42,168 long tons, and 42,211 long tons respectively, for the same period in 1960.

The October consumption figure of 4,070 represents a substantial gain over September's 3,659 long ton consumption. Despite the rise, is it unlikely that the 1961 consumption total will reach that of 1960, reflecting both declining markets, and synthetic latex competition.

Latex is currently selling at a 34-35c per pound level at East Coast ports in carload lots. This is a low for the year, and lower than at any time since the bottom level in 1960 when the last upsurge took place.

Synthetic: The synthetic rubber latex segment continues to do well within the framework of the overall rubber picture. One recent development, whose impact remains to be seen, is the announcement of a new stereospecific latex.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in the extremely narrow range of 5 points since our last report (November 1), high for the period being 35.65c reached on the first of the month and continuing through all trading days to the 17th. The low, of 35.60c was reached on the 17th and remained there for the remaining trading days of the month. The average price of middling uplands for the month of November was 35.63c based on 20 trading days. This compares with an average of 35.61c during October.

While the spot price remains steady within this narrow range, the Kennedy administration offered a proposal that has as one of its salient features, a one-price system for domestic and foreign purchasers, with a subsidy provided for the farmers directly.

Despite the current domestic controversy, the U.S. has been gaining an increasingly larger share of the world consumption market.

If present trends continue, U.S. cotton will make up a greater portion of purchases by importing countries than it did in 1950-60 despite a projected decrease in the actual amount exported.

In the face of this situation the Department of Agriculture has announced that a reduction of 1.9 per cent in the 1962 cotton planting allotment would go into effect despite appeals from growers, the industry, and some Southern Congressmen.

According to these supporters, an increase, rather than a decrease, is warrented at this time because of the strong demand in the offing for cotton next season, the low level of stocks, and the world situation.

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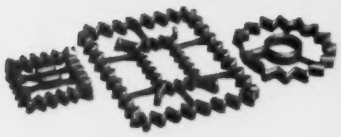

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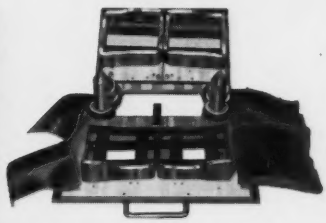

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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

NOVEMBER 1, 1961

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1962 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.60	.61
Accelerator 108*	lb.	—	.92
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.92
Altax*	lb.	.54	.56
Amax*	lb.	.75	.77
No. 1*	lb.	.71	.73
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.68
Bismate, Rodform*	lb.	—	3.00
Butazate 50D*	lb.	.87	.89
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Captax*	lb.	.44	.46
C-P-B*	lb.	—	1.95
Cumate, Rodform*	lb.	—	1.45
Cydac*	lb.	.71	.73
Delac S*	lb.	.71	.73
DIBS*	lb.	—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.51	.52
Dithiocarbamates			
Cyzate B & E	lb.	.85	.89
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.89
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Geigy Amines	lb.	.46	.52
Guantal*	lb.	.62	.69
Hepteen Base*	lb.	—	1.85
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Grains*	lb.	.54	.56
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.50	.57
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.71	.73
Special*	lb.	.75	.77
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.55
Rotax*	lb.	.50	.52
RZ-50-A* and B*	lb.	.70	1.00
Santocure*; NS*	lb.	.71	.78
.26*	lb.	.75	.82
Selenac* (Ethyl, Methyl)	lb.	—	3.00
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.75
Tellurac Rodform (80%)	lb.	—	1.40
Tepidone*	lb.	.45	.45
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiazole ZMBT	lb.	.55	.57
Thiofide*	lb.	.54	.61
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Cyuram DS & MS	lb.	1.14	1.14
Trimene*	lb.	.56	.58
Base*	lb.	1.03	1.06
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	—	2.45
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite AM*	lb.	.76	.78
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17	.18
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210* and 211*	lb.	.16	.18½
Fish Oil, Hydrogenated, Fatty Acid			
Century Hydrex 440	lb.	.09¾	.12¼
DAR-S*	lb.	.09¾	.12¼
DAR-HY*	lb.	.15½	.18
Groco 56*	lb.	.09¾	.12¼
Hydrofol Acids*	lb.	.11	.20½
Hyfac 430*	lb.	.16¼	.18¾
Neo-Fat H.F.O.*	lb.	.14½	.15¾
Neutrex*	lb.	.15	.17½
Stearite*	lb.	.11¾	.14¼
Talene*	lb.	.16¼	.18¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¼
Wochem 730*	lb.	.09¾	.12¼
731*	lb.	.15½	.18
732*	lb.	.16½	.19
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.13¼	—
National Lead*	lb.	—	.13¾
SB*	lb.	—	.18½

ACTIVATORS (Cont'd)

Magnesium Oxide, Heavy			
DCI 601*	lb.	.25¼	—
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.03½	.06½
Michigan No. 15*	lb.	.05½	.06½
Morton's Magnesia	lb.	.25¼	—
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
DCI Technical*	lb.	.21½	.23½
General Magnesite* (neoprene grade)	lb.	.26¾	.28¾
General Magnesite No. 101*	lb.	.24¾	.27¼
Genmeg MLW*	lb.	.25¼	.27¾
Light Calcined Magnesia			
No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.20½	.23½
K* & Y*	lb.	.20½	.23½
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Seamag*	lb.	.20	.20½
Marmag*	lb.	.20½	.23½
Michigan No. 30*	lb.	.24¼	.26½
Michigan 1782 Magnesia*	lb.	.25¼	.26½
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Oleic Acid			
Dar-Chem* 105	lb.	.17½	.20
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210*	lb.	.18	.20½
Groco Red Oil	lb.	.17½	.20
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.17½	.20
Palm Fatty Acids			
Groco 45*	lb.	.16	.18½
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15½	.18
281*	lb.	.16	.18½
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.13¾	—
National Lead*	lb.	.14¼	.14¾
No. 2 RM*	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Century 1210*	lb.	.16¼	.17½
Dar-Chem 11*	lb.	.16¼	.18¾
Emersol 110*	lb.	.16¼	.19¼
Groco 53*	lb.	.16¼	.17½
Neo-Fat 18-53*	lb.	.14¾	.16¾
Stearic Acid, Double Pressed			
Century 1220*	lb.	.16¾	.18
Dar-Chem 12*	lb.	.16¾	.19¼
Emersol 120*	lb.	.17¼	.19¾
Groco 54*	lb.	.16¾	.18
Neo-Fat 18-54*	lb.	.15¼	.17¼
Stearic Acid, Other			
Century 1230*	lb.	.18½	.19¾
1240-Supra*	lb.	.18½	.19¾
Extra Pearlstearic*	lb.	.17½	.20
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¾
18-61*	lb.	.16¼	.18¼
Stearex*	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¼
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.11¼	.13¾
721*	lb.	.11½	.14
White Lead Basic Carbonate	lb.	.18	.19
White Lead Basic Sulfate	lb.	.17	.18
Zinc Laurate Laurex*	lb.	.37	.39
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
DCI Magnesium Carbonate*	lb.	.11	—
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¼	.12¼
Ridacto* (dms.)	lb.	.20	.25
SP-1045*	lb.	.38¼	.38¾
Snodotte* (dlvd.)	lb.	.18½	.21
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

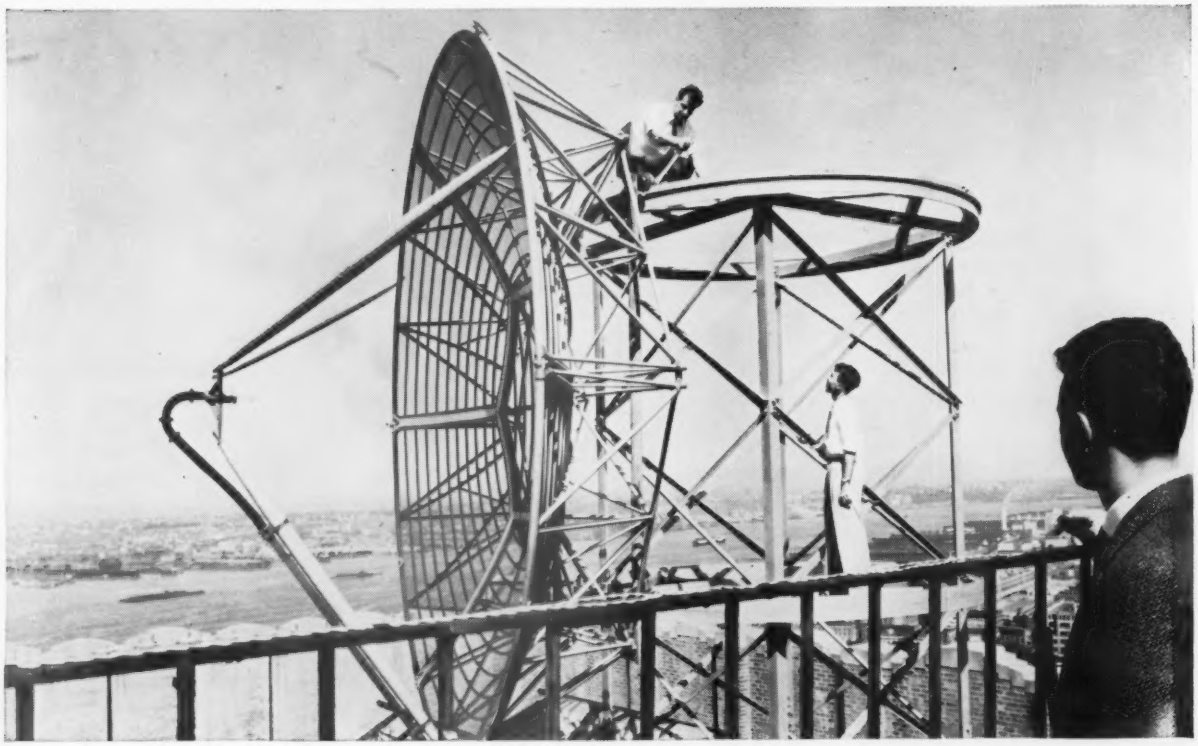
SEASON'S GREETINGS

As lengthening shadows across the winter-bound land tell us that another year is drawing to a close, we at Copolymer pause during the joyous holiday season to extend Christmas greetings and sincere best wishes to you and yours for the year to come.

Copolymer

COPOLYMER RUBBER AND CHEMICAL CORPORATION, BATON ROUGE, LOUISIANA

THE U.S. TREASURY SALUTES THE COMMUNICATIONS INDUSTRY

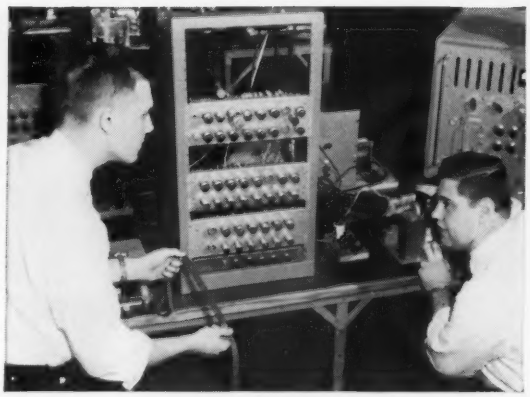


--and its people who buy Savings Bonds and strengthen America's Peace Power

The hundreds of thousands of Americans who earn their living at work with the telephone and telegraph industries are proud of the scope and skills of their service in local and worldwide communication. They're proud, too, of the vast and varied help their industry is giving to our national security.

Thousands of these telephone and telegraph people have a personal hand in building up America's Peace Power, too. They do this by purchasing U.S. Savings Bonds. Their regular purchase of Shares in America helps these patriotic people to reinforce their own security after retirement and to establish current reserves for such sound family projects as new homes and higher education.

It may be that your company has not recently shown your employees the advantages of buying bonds on the Payroll Savings Plan. If so, why not conduct a person-to-person canvass now? Contact your State Savings Bond Director for Payroll Savings promotion materials and personal assistance. Or write to the Savings Bond Division, U.S. Treasury Department, Washington 25, D. C.



Like so many thousands of their fellow craftsmen in the industry, these young employees are making regular use of their company's Payroll Savings Plan to contribute to America's Peace Power.

RUBBER AGE

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	——	.20
Regular*	lb.	——	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	4.85	5.95
Antifoam A Emulsion*	lb.	1.78	2.58
Antifoam AF Emulsion*	lb.	1.78	2.58
Antifoam B*	lb.	.59	1.06
Defoama W-1701*	lb.	——	.12½
Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
Foamnix*	lb.	.60	1.50
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.20½	.22½
1497-V*	lb.	.15¼	.17¼
1907-B*	lb.	.22½	.25
JMK*	lb.	.48½	.51
JMU*	lb.	.23¼	.25¾
JMY*	lb.	.23¼	.23½
NDW*	lb.	.21½	.24
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	4.85	6.25
470*	lb.	.61	1.10
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
DPPD*	lb.	1.12	1.14
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
ISO*	lb.	1.82	1.84
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superflex*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C* Pellets	lb.	.85	.87
CD*	lb.	.79	.81
Aminox*	lb.	.57	.59
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	——	3.25
Betanox Special*	lb.	.94	.96
B-L-E*	lb.	.57	.59
Catalin CAO No. 1*	lb.	.57	.60
CAO No. 3*	lb.	.65	.68
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	——	3.50
Dalpac 4	lb.	.57	.60
Deenax*	lb.	.57	.60
Diphenylamine	lb.	.31	.33
Di-tert-Butyl-para-Cresol*	lb.	.86	1.16
DBPC*	lb.	.54	.60
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.81
Ionol*	lb.	.57	.60
Naugawhite*	lb.	.57	.59
Powder*	lb.	.57	.59
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	.21½
BF-13*	lb.	——	.25½
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.59
Oxidex*	lb.	——	3.60
PDA-10*	lb.	.46	.48
Pennox* A, B, C, D	lb.	.57	.72
Permalux*	lb.	——	2.25
Polygard*	lb.	.57	.59
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3T*	lb.	.54	.61
Sodium Nitrate	cwt.	8.75	11.00
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84¼
Tenamene 3*	lb.	.57	.60
Thermoflex A*	lb.	1.05	1.07
Wing-Stay S*; T*	lb.	.56	.67
Zalba*	lb.	——	1.10
Special*	lb.	——	.85

ANTIOZONANTS

Eastozone 30 and 31*	lb.	.94	.99
Eastozone*; 32*	lb.	1.15	1.20
Flexzone 3C	lb.	——	2.00
6-H	lb.	1.25	1.27
Fura-Tone NC-1008*	lb.	.28	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.71	.78
UOP 88* & 288* (dms.)	lb.	.95	.97
Wing-Stay 100*	lb.	1.00	1.08

ANTI-SCORCHING AGENTS

Akron Benzoic Acid	lb.	.41	.43
Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Irgason BS200*	lb.	2.50	2.75
Ortho Cresol (26°—27°)	lb.	.15	.16
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	4.70	5.80
Webnix 34-L*	lb.	1.25	1.75
57*; 69C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*; 186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.25
Gamma*	lb.	——	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	——	4.35
Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	9.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.70
B-I-K	lb.	.20	.22
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	1.92	1.94
80	lb.	——	1.60
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	1.92
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	——	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.55
Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Braze Cover Cement*	gal.	2.50	4.00
Chemlock 201 and 203*	gal.	5.00	7.50
220*	gal.	8.95	12.00
607*	gal.	15.00	24.00
EX-B501-4*	gal.	6.20	9.40
EX-B150-1*	gal.	8.15	11.00
EX-B579-1*	gal.	19.40	26.00

BONDING AGENTS (Cont'd)

Durez 12987*	lb.	.47½	.49
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.25	1.50
M-50*	lb.	.86	1.11
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Phobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97
Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	2.95	9.80
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10½
M*	lb.	.10½	.11
S*	lb.	.11¾	.12¼
Black Shield 4*	lb.	.10	.10½
No. 6	lb.	.11	.11½
No. 17	lb.	.12½	.13
No. 19	lb.	.12	.12½
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¾	.15

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue* 426	lb.	2.20	3.75
Cyan Blue GT 55-3295	lb.	——	3.20
XR 55-3760	lb.	——	2.90
XR 55-3770	lb.	——	3.25
Disco Blues	lb.	2.20	3.45
Harmon Blue Toner B-4776	lb.	——	2.90
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	1.60	3.25
Stan-Tone MBS*	lb.	2.20	2.92
GPE*	lb.	2.25	2.75
PEC*	lb.	1.95	2.10
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.70

Brown

Brown Iron Oxide	lb.	.15¾	.16
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.30

Green

Akron Masterbatches*	lb.	1.53	3.08
Toners*	lb.	1.50	4.35
Chromium Oxide	lb.	.44½	.45¼
Cooke M.B. Green*	lb.	1.60	2.80
413*	lb.	——	2.80
Cyan Green 15-3100	lb.	——	3.35
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Harmon Green Toner G-5056	lb.	——	3.95
Hi-Fiz Fluorescent	lb.	1.60	2.60
Monastral Rubber Green GSD* (Dispersed)	lb.	3.35	3.50
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	——	1.45
Pigment Green B*	lb.	1.45	1.50
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	3.00	3.10
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Serene Green*	lb.	——	3.50
Solfast Green*	lb.	1.60	3.35
Stan-Tone MBS*	lb.	2.50	3.42
GPE*	lb.	1.50	1.70
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	2.75

Maroon

Akron Masterbatches*	lb.	3.53	4.38
Toners*	lb.	.98	5.60
Harmon Maroon Toner MV-6606	lb.	——	5.75
Pyrolux Maroon*	lb.	——	3.40
Vansul Maroon M.B.*	lb.	——	4.05

COLORING AGENTS (Cont'd)

Orange

Akron Masterbatches*	lb.	2.53	2.98
Toners*	lb.	2.97	4.30
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
425*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Harmon Diane Orange Toner Y-25	lb.	—	2.85
Pyrazolone Orange Toner YB-3	lb.	—	3.30
Hi-Fiz Fluorescent	lb.	1.40	2.40
Mercadium X-2667*	lb.	—	1.73
Molybdate Orange	lb.	—	.49
Oswego Orange X-2065*	lb.	—	3.30
Rubber Orange OD* (Disp.)	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.28
Cadmium Paste*	lb.	2.43	2.85
GPE*	lb.	1.05	1.20
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.30	2.65

Red

Akron Masterbatches*	lb.	1.30	3.68
Toners*	lb.	.98	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Bonadur 20-6440	lb.	—	1.90
20-6540	lb.	—	2.00
Brilliant Toning Reds*	lb.	1.77	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Clarion 20-7150	lb.	—	1.35
Cooke M.B. Red*	lb.	1.05	3.25
410*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Harmon Electra Red Toner	lb.	—	3.45
Lithol Rubine Toner R-6142	lb.	—	1.60
Pyrazolone Red Toner	lb.	—	1.40
Rincon Red Tones	lb.	—	1.90
Hi-Fiz Fluorescent	lb.	1.15	2.15
Kroma Reds*	lb.	.14¼	.14½
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.80
X-2669 Medium Light*	lb.	—	1.88
X-2670 Medium*	lb.	—	1.95
X-2671 Dark*	lb.	—	2.03
Naphthol 20-7575	lb.	—	3.80
Oximony Red Iron Oxide	lb.	.14¼	.14½
Plasticone Red*	lb.	1.02	4.60
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.13½	.13¾
Red Iron Oxide, Light	lb.	.14¼	.14½
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.98
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.70	3.05
PC*	lb.	1.10	1.45
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Permolith*	lb.	.0825	.09125
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.0265
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25	.26½
Rutile Grades*	lb.	.27	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal* R-22*, R-25*, R-27*	lb.	.09½	.09⅞
R-60*	lb.	.09⅜	.10⅛
Ti-Pure* Anatase Grades*	lb.	.25	.26
Rutile Grades	lb.	.27	.28
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14⅜	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09⅜	.10⅛
RC-HT* (dlvd.)	lb.	.09⅜	.09⅞

COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1250	.1350
AZO-ZZZ 11*, 22*, 33*, 44* 55*	lb.	.1250	.1350
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label* 20, 20-21	lb.	.1450	.1550
Red Label* 30, 31	lb.	.1450	.1550
Green Label* 12, 46 (latex only)	lb.	.1450	.1550
Green Label* 42, 42-21, 42A-3, 43 Pelets	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1250	.1350
Florence Green Seal*	lb.	.1450	.1550
Red Seal*	lb.	.1450	.1550
White Seal*	lb.	.1475	.1575
Kadox 25*	lb.	.1350	.1450
15*, 17*, 72* & 515	lb.	.1300	.1400
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartona)	lb.	.1600	.1700
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 12%*	lb.	.1250	.1350
18%*	lb.	.1400	.1500
35%*	lb.	.15375	.16375
50%*	lb.	.1575	.1675

Yellow

Akron Masterbatch*	lb.	1.27	2.48
Toners*	lb.	2.20	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	—	1.19
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
Disco Yellows	lb.	2.05	3.95
Harmon Benzidene Yellow Toner YB-2	lb.	—	2.25
Fanchon Yellow Toner	lb.	—	2.20
Hi-Fiz Fluorescent	lb.	1.60	2.60
Iron Oxide, Pure Light Shades	lb.	.12½	.12¾
Dark Shades	lb.	.12	.12¼
Mapico Yellow* (50 lb. bags)	lb.	.1250	.1275
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.55
Stan-Tone Cadmium Dry*	lb.	2.80	3.03
Cadmium Paste	lb.	1.72	1.82
MBS*	lb.	1.30	2.20
GPE*	lb.	.70	3.25
PC*	lb.	.55	3.50
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.14¼	.14½
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¾
Darvan No. 1*	lb.	.25¼	.38¼
No. 2*; No. 3*	lb.	.23¾	.36¾
No. 6*	lb.	.18½	.19
No. 7*	lb.	.26¼	.36¼
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55

DISPERSING AGENTS (Cont'd)

Lipal No. 9N*; 11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¾	.06¾
CB*	lb.	.15	.17
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccosol A (dlvd.)	lb.	—	.52
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopcosant*	lb.	.15¼	.15¾
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¼
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¾
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Arcco 1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A*	lb.	—	.144
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*; W*	lb.	—	.07
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vanadiset B*	lb.	.0360	.07
C*	lb.	.0310	.06
MR* 80 mesh	lb.	.08½	.12½
Vistanex MM Grades*	lb.	.35	.37½
Wilcarbo Carbon Powders*	lb.	.08	.15

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	-110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Aluminum Hydrate*	lb.	.035	.065
Aluminum Silicate			
AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	-126.50
Barytes			
No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	60.00	84.85
Sparmite*	ton	80.00	90.00
XIOR*	ton	90.00	95.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	-142.00
Calcium Carbonate			
Allied Whiting	ton	—	11.50
Atomite* (c.l.)	ton	32.50	35.00
B.I. White No. 1 (c.l.	ton	—	10.00
Calcene NC*	ton	80.00	-100.00
CO*	ton	105.00	-125.00
TM*	ton	82.50	-102.50
Calwhite*	ton	20.00	25.00
T*	ton	25.00	30.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
Carbium	ton	30.00	40.00
CCC "G"*	ton	15.00	17.00
CCC No. 1*	ton	10.50	12.50
CCO White*	ton	—	22.00
Duramite*	ton	20.00	22.00
Gamaco* (c.l.)	ton	32.50	37.50
T*	ton	37.50	42.50
GamaKal*	ton	37.50	42.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Kalmac*	ton	23.00	28.00
Laminar*	ton	—	30.00
Lesamite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	-137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	65.00	85.00
SC* (and T*)	ton	117.50	-137.50
U*	ton	127.50	-147.50
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	20.00	22.00
Super Multifex*	ton	167.50	-187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
R*	ton	127.50	-150.00
RC*	ton	117.50	-140.00
York White*	ton	—	11.50

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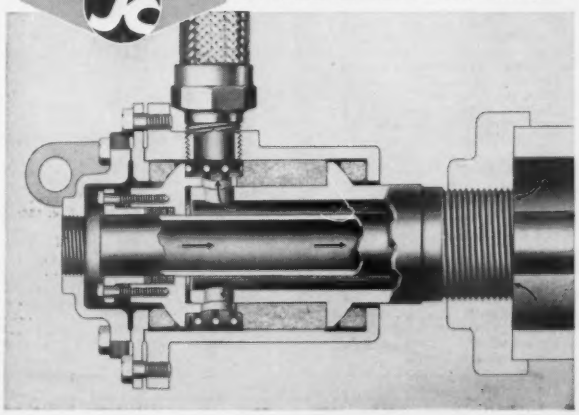

FILLERS (Cont'd)

Calcium Silicate			
Silene EF*	ton	130.00	-150.00
Silene L*	ton	135.00	-155.00
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	- 22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	- 17.00
Chalk Whiting (l.c.l.)	lb.	.01½	- .01¾
Recco Paris Whiting*	ton	—	- 35.00
OMYA Whiting*	ton	—	- 35.00
Clay			
Afton Clay*	ton	13.00	- 38.00
Aiken Clay*	ton	14.50	- —
Akron HC-100*	ton	14.50	- —
HC-75*	ton	13.00	- —
SC-25*	ton	14.50	- —
Alsilite* (c.l.)	ton	30.00	- 45.00
Aluminum Flake*	ton	25.50	- 28.50
Barden R*	ton	7.50	- 12.00
Buca* (c.l.)	ton	—	- 45.00
Burgess No. 20*	ton	—	- 33.00
No. 30*	ton	—	- 40.00
Burgess Iceberg*	ton	—	- 53.00
Icecap K*	ton	—	- 65.00
Catalpo* (c.l.)	ton	33.00	- —
Champion*	ton	—	- 14.50
Crown*	ton	—	- 14.50
Dixie* (c.l.)	ton	—	- 14.50
Dover*	ton	—	- 13.00
Franklin Clay—R* (c.l.)	ton	16.00	- 41.50
G. K. Soft*	ton	11.50	- 32.00
Glomax HE (bags)	ton	65.00	- —
LL (bags)	ton	53.00	- —
PVR (bags)	ton	40.00	- —
WZ (bags)	ton	45.00	- —
Harwick Clays*	ton	21.50	- 77.00
Hydrite RS (bags)	ton	30.00	- —
PXS (bags)	ton	45.00	- —
UF (bags)	ton	100.00	- —
10S (bags)	ton	50.00	- —
Flat "D" (bags)	ton	25.00	- —
Hi-White R*	ton	10.00	- 14.50
Kaolloid Clay* (c.l.)	ton	—	- 10.50
LGB*	ton	13.00	- 17.50
LGP*	ton	15.50	- 20.00
McNamee* (c.l.)	ton	—	- 14.50
Natka 1200	ton	12.00	- 35.00
Par* (c.l.)	ton	—	- 12.00
Paragon*	ton	10.00	- 14.50
Pigment 5*	ton	27.50	- 34.50
33*	ton	—	- 40.00
Polyfil 40	ton	40.00	- —
70	ton	53.00	- —
80	ton	65.00	- —
C	ton	25.00	- —
F	ton	45.00	- —
X	ton	30.00	- —
Recco* (c.l.)	ton	—	- 14.50
Swanee Clay*	ton	—	- 12.50
Snobrite*	ton	—	- 12.50
Suprex*	ton	10.00	- 14.50
Whitetex* (c.l.)	ton	53.00	- —
Windsor*	ton	14.50	- 39.50
4200 Clay*	ton	13.00	- —
Diatomaceous Earth	ton	30.00	- 50.00
Celatom MN-33	ton	36.00	- 95.00
MP-25	ton	55.00	-121.00
MP-63	ton	55.00	-121.00
Celite 270	ton	55.00	-121.00
292	ton	36.00	- 95.00
315; 350	ton	137.00	-225.00
Kaylorite* (c.l.)	ton	—	- 30.00
Lorite*	ton	—	- 36.00
Flock			
Cotton (White)	lb.	.28	- .30
Colored	lb.	.12	- .20
Filfloc F 40-9000*	lb.	—	- .13
F 6000*	lb.	—	- .36
Nylon	lb.	—	- .35
Polycel*	ton	110.00	-210.00
Rayon, Bleached or Dyed	lb.	.75	- 1.20
Rayon, Grey	lb.	—	- .18
Rayon, Pink	lb.	—	- .20
Solka-Floc* (l.c.l.)	lb.	.07	- .16
Glue, Amber	lb.	.17	- .19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	-100.00
Leather			
Flour (dust)	lb.	.12	- .15
Shredded	lb.	.03	- .17
Lignin	lb.	.06	- .08
Limestone, Pulverized	ton	3.00	- 5.00
Asbestol Regular*	ton	28.00	- —
Asbestol Superfine*	ton	33.00	- —
Georgia Marble No. 10*	ton	—	- 11.00
Industrial Filler No. 100*	ton	—	- 7.75
Micro Velva A*	ton	53.00	- —
L*	ton	61.00	- —
No. 1 White*	ton	—	- 11.00
Magnesium Carbonate	lb.	.10½	- .13
Magcarb L*	lb.	.11	- .13
Michigan*	lb.	.11	- .15
Magnesium Silicate (see Talc)			
Mica	lb.	.01¾	- .07¾
Concord*	lb.	.08	- .08¾
Micro-Mica*	lb.	.08	- .08¾
Mineralite* (c.l.)	ton	40.00	- 85.00
Silversheen*	lb.	.08	- .08¾
Triple A Mica* (c.l.)	ton	—	- 40.00
Vermiculite*	lb.	—	- .11
Wet Ground Biotite Mica	lb.	.06½	- .07¼
Wet Ground Mica No. 160*	lb.	.08	- .08¾

FILLERS (Cont'd)

Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	—	- 11.50
Pyrax A* (c.l.)	ton	14.50	- 15.00
WA* (c.l.)	ton	17.00	- 17.50
Sawdust, Graded	ton	14.00	- 35.00
Silica	ton	16.00	- 27.00
Extra Fine (bags) (c.l.)	ton	—	- 43.00
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Lo-Micron Slate Flour*	lb.	—	- .04½
No. 133 Slate Flour*	ton	—	- 4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	- .07
Talc (Magnesium Silicate)			
Akron Soapstone*	ton	—	- 9.75
Asbestol Regular*	ton	—	- 27.00
Eastern RC-500*	ton	—	- 32.00
No. 41*	ton	—	- 19.70
No. 549*	ton	—	- 63.00
French*	ton	—	- 59.00
No. 367*	ton	—	- 13.00
No. 1600*	ton	—	- 70.60
No. 1768*	ton	—	- 13.00
Nytal 200* (c.l.)	ton	—	- 28.00
300* (c.l.)	ton	—	- 38.00
Sierra Fibrene C-400*	ton	34.00	- 40.00
Sierra Supreme 325*	ton	51.00	- 56.00
Sierra White*	ton	21.75	- 26.75
Soapstone*	ton	—	- 13.00
Walnut Shell Flour	ton	55.00	-100.00
Agrashell*	ton	55.00	-115.00
Stan-Shell*	ton	50.00	-110.00
Whiting, Commercial	ton	—	- 7.50
Allied Whiting*	ton	—	- 11.50
Camel-Carb*	ton	—	- 10.00
Calwhite (c.l.)	ton	—	- 20.00
C-C-O White*	ton	—	- 22.00
Georgia Marble No. 15*	ton	—	- 20.00
No. 16*	ton	—	- 20.00
Pigua No. 1 YAA* (c.l.)	ton	10.00	- 10.00
No. 2 LS* (c.l.)	ton	10.00	- 10.00
Snowflake* (c.l.)	ton	20.00	- 22.00
Stan-White 325*	ton	11.50	- 14.10
Ultrasil*	lb.	.35	- .50
Veroc* (c.l.)	ton	—	- 11.50
Welco* (c.l.)	ton	—	- 10.50
York White R* (c.l)	ton	—	- 11.00
Wood Flour	ton	31.50	- 48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	- 2.35
Black Out*	gal.	4.50	- 8.00
Calcium Hypochlorite (dms.) (cwt.)	ton	33.30	- 37.90
Shellac, Orange Gum	lb.	.35	- .45
VanWax*	gal.	2.00	- 2.05

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	—	- .65
Chlorowax 40*	lb.	.15	- .17½
50*	lb.	.16	- .18½
70*	lb.	.18½	- .20
Halowax*	lb.	.36	- .46
Zinc Borate 3167*	lb.	.1920	- .2020
Zyrox Compounds*	lb.	.38	- .95½

LATEX MODIFIERS

Crux*	lb.	.30	- .65
Foamnix*	lb.	.60	- 1.50
Ludox	lb.	.15	- .16¾
Nopco EB*	lb.	.16¾	- .18¾
EB-1*	lb.	.16¾	- .18¾
EB-5*	lb.	.19½	- .21½
OPD-101*	lb.	.29	- .40
Piccopale A-1 Emulsion	lb.	.086	- .113
A-20	lb.	.089	- .116
A-22	lb.	.097	- .124
A-41; A-43	lb.	.0775	- .0145
C-1	lb.	.091	- .118
N-3	lb.	.100	- .127
STAYB*	lb.	.25	- .45
Syton 200	lb.	.15	- .16¾
Ubatol U-2001* (t.c.)	lb.	.166	- .187
U-2003* (t.c.)	lb.	.184	- .208
U-2007* (t.c.)	lb.	.166	- .187
U-3025* (c.l.)	lb.	.223	- .235
U-3040* (c.l.)	lb.	.260	- .272
U-3045* (c.l.)	lb.	.260	- .272
U-3050* (c.l.)	lb.	.195	- .207
Webnix*	lb.	1.25	- 2.00

LUBRICANTS, MOLD

Akro Gel*	lb.	—	- .165
Alipal CO-433*	lb.	—	- .20
CO-436*	lb.	—	- .24
Aluminum Stearate Crown Brand*	lb.	.37	- .42
Amine, Mixed Crude*	lb.	.19	- .25
Aquadag*	lb.	3.50	- 4.00
Aquarex D*	lb.	—	- .81
L*	lb.	—	- .94
ME*	lb.	—	- .82
MDL*	lb.	—	- .33
WAQ*	lb.	—	- .22
Armeen HT*	lb.	.34	- .40
180*	lb.	.52	- .56
Armid HT (flaked)*	lb.	.42	- .46
0*	lb.	.39	- .41
Borax Granular (l.c.l.)	ton	89.00	- 94.00

LUBRICANTS, MOLD (Cont'd)

Carbowax 4000*	lb.	.31	- .32
CD Mold Release B*	gal.	5.00	- —
B-2*	gal.	5.00	- —
Colite Concentrate* (dms.)	gal.	.90	- 1.15
Colite D43D*	gal.	1.15	- 1.40
Concentrex*	lb.	—	- .25
Dag Dispersion No. 197*	lb.	1.95	- 2.90
D.C. 7 Compound*	lb.	4.70	- 5.80
D.C. Emulsion No. 7*	lb.	1.59	- 2.07
No. 8*	lb.	1.15	- 1.69
No. 35*; 35A*	lb.	1.15	- 1.69
No.35B*	lb.	1.15	- 1.69
No. 36*	lb.	1.15	- 1.69
D.C. Mold Release Fluid*	lb.	2.90	- 3.47
Dri-Lube*	lb.	—	- .22
Dry-Flo* (50 lb. bags)	lb.	21.40	- —
Emulsion Lubricant A80*	lb.	—	- 1.20
45*	lb.	—	- 1.20
G-E Silicone Emulsion			
SM-55*	lb.	1.15	- 1.69
SM-61*	lb.	1.15	- 1.69
SM-62*	lb.	1.15	- 1.69
G-E Silicone Fluid SF-92*	lb.	2.90	- 4.05
SF-96*	lb.	2.90	- 4.05
Hawkeye Flake* (dlvd.)	lb.	.11½	- .13¾
Igepal CO-430*	lb.	—	- .29
CO-630*	lb.	—	- .29
CO-530*	lb.	—	- .29
Igepon AP-78*	lb.	—	- .48
T-33*	lb.	—	- .21
T-51*	lb.	—	- .13½
Kokobace R*	lb.	.17½	- .18½
Lipal 9-N*	lb.	.28	- .29
7-O*	lb.	.29	- .30
Lubrex	lb.	.25	- .30
Lubri-Flo*	gal.	10.00	- 12.00
Migralube*	lb.	—	- .35
ML-1027-2C*	gal.	—	- 2.65
ML-1028-2C*	gal.	—	- 2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	—	- 1.90
Mold Lubricant No. 426* (dms.)	lb.	.18	- .17
No. 735* (dms)	gal.	—	- 1.25
No. 769* (dms.)	gal.	—	- 1.20
No. 825* (dms.)	gal.	—	- 2.00
No. 856* (dms.)	gal.	—	- 1.90
No. 880* (dms.)	gal.	—	- 1.19
No. 887* (dms.)	gal.	—	- 1.80
No. 935* (dms.)	gal.	—	- 1.56
No. 956* (dms.)	gal.	—	- 2.50
No. 965* (dms.)	gal.	—	- 2.15
No. 967* (dms.)	gal.	—	- 2.40
No. 969* (dms.)	gal.	—	- 1.50
No. 970* (dms.)	gal.	—	- 4.50
No. 975* (dms.)	gal.	—	- 2.85
No. 980* (dms.)	gal.	—	- 1.53
No. 987* (dms.)	gal.	—	- 2.45
A 187* (dms.)	gal.	—	- 1.90
A 256* (dms.)	gal.	—	- 1.20
A 988* (dms.)	gal.	—	- 2.60
Moldeze No. 3*	gal.	—	- 4.95
Mold-Brite*	gal.	—	- 1.50
Monopole Oil MD*	lb.	—	- .16
MR-22 Silicone Semi-Permanent	gal.	9.95	- 14.95
Olate Flakes*	lb.	.23½	- .24¾
Orvus WA Paste* (dms.)	lb.	—	- .23¼
Plaskon Polyethylene S*	lb.	.32	- .47
Poly-Brite PE-20	lb.	.28	- .42
600	lb.	.42	- .58
Poly-Cone 125X	lb.	1.15	- 1.30
1,000	lb.	.91	- 1.04
Polyglycol 15-200*	lb.	.25	- .28¾
E4000*	lb.	.31	- .37
Prodag*	lb.	.32	- .60
Purity Flake* (dlvd.)	lb.	.14¼	- .16½
Rubber-Flo*	gal.	1.25	- 2.00
Rubber-Glo*	gal.	—	- .94
Rusco Mold Paste*	lb.	.25½	- .32
Sericite* (l.c.l.)	ton	65.00	- 75.00
Silicone Oil A145*	lb.	3.22	- 3.61
A220* (dms.)	lb.	—	- 2.80
Silrex (dms.)	lb.	—	- .65
Rubars*	lb.	—	- .22¾
Soybean Lecithin	lb.	.13	- .17
Thermalube*	lb.	—	- .13¾
UC Silicone L-45*	lb.	2.90	- 4.61
L-522*	lb.	2.68	- 3.50
LE-45*	lb.	1.15	- 1.69
LE-450*	lb.	1.15	- 1.69
Ucon Lubricants*	lb.	.26¼	- .27¾
Ulco Mold Soap*	lb.	.19	- .29

LUBRICANTS, RUBBER

Cyclolube NN-1; NN-2; NN-3	gal.	.12½	- .20½
NN-4	gal.	.13½	- .21½
114	gal.	.19	- .27
4053	gal.	.21	- .29
Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	- .25
Extrud-o-Lube*	gal.	1.33	- 1.54
Ivory Chips*	lb.	.19¾	- .20¾
LatexLube GR* (dlvd)	lb.	.19¼	- .21½
No. 82-A* (450 lb. dms.)	lb.	—	- .08½
Nopcowax 22-DS*	lb.	.38½	- .41
Propylene Stearate (dms.)	lb.	.35	- .60
Versa-Lube B*	lb.	.16	- .18

LUBRICANTS, RUBBER SURFACE

Antidust	lb.	.37	.41
Barium Stearate	lb.	.41	.46
Calcium Stearate	lb.	.39	.44
Crown Brand*	lb.	.37	.42
D.C. 7 Compound*	lb.	4.70	5.80
D.C. 200 Fluid*	lb.	2.90	3.47
ELA*	lb.	—	.82
G-E Silicone Fluid SF-92*	lb.	3.04	4.25
Glycerized Lubricant*	gal.	1.25	1.48
Glydag B*	lb.	1.60	2.25
Glyco-Lube* (dms.)	lb.	—	.14
No. 3* (dms.)	lb.	—	.14
Hydro-Zinc*	lb.	—	.20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	.19¼
R-66*	lb.	—	.17¼
Liqui-Lube* (dlvd.)	lb.	—	.17¾
N.F.* (dlvd.)	lb.	—	.17¾
N.T.* (dlvd.)	lb.	—	.16¾
Lubrex*	lb.	.27	.32
Lubri-Cote	gal.	.86	1.00
Magnesium Stearate	lb.	.42	.47
Crown Brand*	lb.	.40	.45
Polyethylene Glycol	lb.	.22	.26
Rexanol*	lb.	—	.13
Rubber Free (Concentrate)*	gal.	—	1.44
Jel*	lb.	.18	.21½
Separex*	lb.	.08½	.10½
Slab-Dip* (dms.)	lb.	—	.17
Soybean Lecithin	lb.	.13	.17
Stock-Lube*	lb.	—	.19
UC L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-450*	lb.	1.15	1.69
XL-42*	lb.	3.10	4.75
XLE-42*	lb.	1.22	1.70
XLE-420*	lb.	1.18	1.70
Wet Zinc*	lb.	—	.22¼
CW*, P*	lb.	—	.20
Zinc Stearate	lb.	.41	.46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45	1.65
Alkon* (dlvd.)	lb.	.16	.16½
CA-301*	gal.	—	2.49
CA-302*	gal.	—	2.63
G-O 6910*	lb.	.38	.40
Metso Anhydrous*	cwt.	5.70	7.95
Metso 99*	cwt.	5.00	7.25
200*	cwt.	6.70	8.95
Granular*	cwt.	4.45	6.70
Orvus Extra Granules*	lb.	.23¼	.24¾
Polo*	lb.	.12¾	—
Rubber-Sol*	gal.	2.97	3.97
Shelblast*	lb.	.04	.08¼
Sprex A.C.* (dlvd.)	lb.	.17¼	.18¾
Zip Mold Cleaner*	gal.	1.05	1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	1.25
Pepton 22 Plasticizer*	lb.	.83	.86
65*	lb.	1.23	1.26
65B*	lb.	.83	.86
Pitt-Consol 640 (dms.)	lb.	—	.42
646 (dms.)	lb.	—	.52
RPA 2*	lb.	—	.85
3*	lb.	—	.51
3 Conc.*	lb.	—	.85
6*	lb.	—	1.66

PLASTICIZERS & SOFTENERS

Actisil	lb.	.26	.27
Acto 500*	lb.	—	.08
Adipol BCA*	lb.	.46	.46½
2EH*	lb.	.37½	.39
10A*	lb.	.37½	.39
ODY*	lb.	.37½	.39
XX*	lb.	.37½	.39
Admex 562 (dms.)	lb.	.50¾	.51¾
710 (dms.)	lb.	.35¾	.36¾
711 (dms.)	lb.	.37¾	.38¼
744 & 745 (dms.)	lb.	.41¾	.42¼
760 (dms.)	lb.	.59¾	.60¼
761 (dms.)	lb.	.46¾	.47¼
770 (dms.)	lb.	.42¼	.43
Anhydrol 6990*	lb.	.51	.56
Arneel SD*	lb.	.34	.40
Arolene 1980* (c.l.)	lb.	—	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.08	.08½
Aromatic Tar	gal.	.0573	.1973
Bardol*	lb.	.02¾	.03¾
B*	lb.	.06¼	.06½
Bayol D*	gal.	—	.382
F*	gal.	—	.52
Bearflex 1751*	lb.	.14	.15
LPO*	lb.	.03	.04
MPO*	lb.	.03¾	.04¾
Beeswax, Bleached	lb.	73	.75
Yellow Refined	lb.	.64	.65
Bondogen*	lb.	.55½	.60½
B.R.C. No. 20*	lb.	.0150	.0175
No. 21*	lb.	.02¾	.03
No. 22*	lb.	.02½	.02¾
B.R.H. 2*	lb.	.0213	.0351
BRS 700*	lb.	.0200	.0285
B.K.T. 3*	lb.	.0180	.0265
7*	lb.	.0250	.0260
7*	lb.	.0300	.0310
B.R.V.*	lb.	.0475	.0565
Bunarex Resins*	lb.	.07	.08

PLASTICIZERS & SOFTENERS (Cont'd)

Bunatak AH*	lb.	—	.09½
N*	lb.	—	.11
U*	lb.	—	.17½
No. 90*	lb.	—	.09
No. 210*	lb.	—	.14
Butac*	lb.	.1585	.1685
Butyl Carbitol Periargonate (dms.)	lb.	—	.04½
Butyl Cellosolve Periargonate (dms.)	lb.	—	.08
Butyl Oleate	lb.	.26	.27
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.28½	.29½
Byerflux*	gal.	.28½	.29½
Califlux 510* (and 550*)	lb.	.02¾	.03¾
G.P.*	lb.	.01½	.02½
R-100*	lb.	.04¾	.05¾
LBL*	gal.	.17	.25
OSR*	lb.	.01¾	—
RC*	gal.	.13½	.21½
TT*	lb.	.0195	.0295
Candelilla Wax, Prime	lb.	.53	.64
Refined Light	lb.	.56	.60
Carbowax 4000* (dms.)	lb.	.68	.70
Cardolite NC-103*	lb.	.36	.59
Carnauba Wax, Crude	lb.	.73	.74
Flaked	lb.	.73	1.25
Refined, Technical	lb.	.73	.74
Refined, Pure	lb.	.82	.86
Yellow	lb.	1.10	1.15
Cellulflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	.32½
179-A* (t.c., dlvd.)	lb.	—	.32½
179-C* (t.c., dlvd.)	lb.	—	.32½
179-EG* (t.c., dlvd.)	lb.	—	.32½
DBP* (t.c., dlvd.)	lb.	—	.30
DOP* (t.c., dlvd.)	lb.	—	.28½
TPP* (dms., eqld.)	lb.	—	.40
Ceresin Wax	lb.	.12	.30
Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
LV*	lb.	.17	.19½
CTLA Polymer*	gal.	.20	.36
Cumar Resins*	lb.	.07	.19
Cyclolube OSR*	gal.	.28	.36
Darex DBM*	lb.	.30½	.34
DBP*	lb.	.30	.33½
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¼
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	lb.	—	.14
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate (dms.)	lb.	.93	.93½
Dibutoxyethyl Sebacate	lb.	—	.61½
Dibutyl Phthalate (dms.)	lb.	.29¼	.30¾
Dibutyl Sebacate	lb.	.67½	.68½
Dicapryl Adipate (dms.)	lb.	.41½	.42½
Dicapryl Phthalate (dms.)	lb.	.27½	.29
Dicapryl Sebacate	lb.	.58	.59½
Di-Carbitol Phthalate (dms.)	lb.	.50½	.51
Dicyclohexyl Phthalate	lb.	.45	.46½
Diethyl Phthalate (dms.)	lb.	.28¼	.29¾
Di-2-ethylhexyl Phthalate (dms.)	lb.	.26	.27½
Dihexyl Adipate (dms.)	lb.	.46½	.47½
Dihexyl Phthalate (dms.)	lb.	.32½	.33½
Dihexyl Sebacate (dms.)	lb.	.66	.66½
Diisobutyl Azelate	lb.	—	.47¼
Diisobutyl Phthalate	lb.	.29	.30½
Di-iso-octyl Adipate	lb.	.42½	.43½
Dimethyl Phthalate (dms.)	lb.	.28¼	.29¾
Dimethyl Sebacate (dms.)	lb.	1.30	1.30½
Dinonyl Adipate	lb.	.44½	.47½
Dinopol IDO*	lb.	.25½	.27
MOP*	lb.	.25½	.27
Dioctyl Adipate (dms.)	lb.	.42½	.43½
Dioctyl Phthalate (dms.)	lb.	.25	.26½
Dioctyl Sebacate (dms.)	lb.	.61¼	.62¼
D.I.O.P. (dms.)	lb.	.28½	.30
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10*	lb.	.06	.06¼
Dutrex* 1, 6, 7	gal.	.18	.23
6H	gal.	.13	—
15E	gal.	.11	.23
20, 25	lb.	.03	.06
33	gal.	.21	.33
DX-111	lb.	.13¼	.14¼
DX-111 NS	lb.	.14¼	.15¼
DX-40	lb.	.14¾	.15¾
Elastex 10-P*	lb.	.30½	.33½
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	lb.	—	.58
Epoxy Plasticizer	lb.	.33½	.36
Drapex 3.2*	lb.	.39¼	.40¼
Drapex 4.4*	lb.	.34¾	.35¾
Drapex 7.7*	lb.	.37	.38
Esparto Wax	lb.	—	.55
Estac*	lb.	—	.16
Facile Gum 4A*	lb.	.48	.50
Flexol B-400*	lb.	.29	.30
DOP*	lb.	.29	.30½
TOF*	lb.	.47	.48
3GH*	lb.	—	.46¾
3GO*	lb.	—	.55¾
4GO*	lb.	—	.36½
426*	lb.	.28½	.30
Flexricin P-1*	lb.	.33½	.36½
P-4*	lb.	.40½	.33¼
P-6*	lb.	.37	.40
P-8*	lb.	.30¼	.33¼
Fortex A* (dms.)	lb.	.12½	.44½
Fura-Tone NC-1008*	lb.	.28	.39
Galex W-100*	lb.	.15½	.19¼

PLASTICIZERS & SOFTENERS (Cont'd)

Good-rite GP233*	lb.	.40	.43½
GP235*; GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Halico C-255-NS*	gal.	.27½	.29½
C-566*	lb.	.11	.13
Hartlex 300* (dms.)	lb.	.60½	.61
325* (dms.)	lb.	.45	.45½
330* (dms.)	lb.	.46¼	.46¾
375* (dms.)	lb.	.76	.76½
HB20*	lb.	.17	.18½
HB40*	lb.	.21½	.23
Herron-H.T.*	gal.	.16	.27
Herron-Plas*	lb.	—	.03¼
Herron-Wax*	lb.	.05¼	.06
No. 23*	lb.	.08¾	.08¾
No. 24*	lb.	.07¼	.07¾
HSC No. 13*	lb.	.25	.32
No. 39*	lb.	.22	.29
Indonex W-2*	gal.	.12	—
Isooctyl Decyl Phthalate (dms.)	lb.	.28	.29½
K-stay*	lb.	.12	.13
Kapsol*	lb.	.35	.35½
Kenflex A & N*	lb.	.19	.34
Kesscoflex BCL* (dms.)	lb.	—	.37
BCO* (dms.)	lb.	—	.33
BCP* (dms.)	lb.	—	.36
BCS* (dms.)	lb.	—	.32
BO* (dms.)	lb.	—	.28¼
BS* (dms.)	lb.	—	.27½
DBT* (dms.)	lb.	—	.68
DIOA* (dms.)	lb.	—	.43½
DOA* (dms.)	lb.	—	.43½
MCO* (dms.)	lb.	—	.35½
MCP* (dms.)	lb.	—	.41
MCS* (dms.)	lb.	—	.35
TRA* (dms.)	lb.	—	.40
KP 20*	lb.	.25	.26½
23*	lb.	.32½	.33½
48*	lb.	.24½	.26
90*	lb.	.44½	.46
140*	lb.	.48	.48½
177*	lb.	.48¾	.49¼
201*	lb.	.46	.47½
260*	lb.	.35½	.37
310*	lb.	.29¼	.30¾
Kremol 40*	gal.	.36	.46
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.37¼	.38¼
Kronitex AA* (dms.)	lb.	.35	.36
1, K-3, MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	—	.26
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	—	.29¾
Leflex 6812	lb.	.37	.42
6813	lb.	.36½	.41½
6820	lb.	.31	.36
Lindol* (dms., t.c.)	lb.	—	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	lb.	1.25	1.30
Methox*	lb.	.40	.41
Methyl Laurate	lb.	.25	.37
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.10
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.21	.26
Flaked	lb.	.29	.29
Morflex*	lb.	.32	.69½
Natac*	lb.	.1535	.1635
Nebony Resins* (dms.)	lb.	.04½	.05½
Neolene 210* (t.c.)	lb.	—	.16
212* (t.c.)	lb.	—	.14
220* (t.c.)	lb.	—	.15
Nerium*	lb.	—	.09
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13½
LX-685* (dms.)	lb.	.12	.17½
LX-782 (dms.)	lb.	.07½	.08½
LX-828* (dms.)	lb.	.11	.12½
LX-1000* (dms.)	lb.	.12	.13
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	lb.	—	.24
No. 480 Oil Proof Resin*	lb.	—	.18
Obopex Q10* (dms.)	lb.	.26½	.28
R9* (dms.)	lb.	.37¼	.37¾
OPD*	lb.	.29	.40
Ortho-Nitrobiphenyl	lb.	.13	.15
Ozokerite Wax, White and Yellow	lb.	.24	.31
Panaflex BN-1*	lb.	.18	.22¼
Panarez 3-210	lb.	.12½	.14
6-210	lb.	.12	.13½
12-210	lb.	.11½	.13
Paradene Resins (dms.)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (t.c.l.)	lb.	.046	.048
Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¾	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.32½	.32½
G-62*	lb.	.33¾	.33¾
Parmo*	lb.	.06	.13½
Peroxidol 780*	lb.	.33¼	.36¼
781*	lb.	.34¾	.37¾
Petroflux MV*	gal.	.097	.177
Petrolatum (dms.)	lb.	.04¼	.14¼

PLASTICIZERS & SOFTENERS (Cont'd)

PG-16*	lb.	——	.35
Philrich-5* (t.c.)	gal.	——	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.06½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.1200	.1360
Piccoumaron Resins*	lb.	.07	.18
Pigmentar* Pigmentaroil*	lb.	.510	.684
Pitt-Consol 500* (dms.)	lb.	.30	.30½
Plastac M*	lb.	——	.09¼
Plasticil	lb.	.10½	.11¾
NS	lb.	.11½	.12¾
Plasticizer 2286*	lb.	——	.26¼
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	——	.07
Plasticizer MP*	lb.	——	.08
Plasticizer MT-511*	lb.	——	.69¼
Plasticizer OLN*	lb.	.36	.42
Plasticizer SC*	lb.	.42	.46
Plasticizer W-13*	lb.	.37	.38¾
Plastoflex 3*	lb.	——	.52
52*	lb.	.37¾	.38¾
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¼	.40¼
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.23½	.27½
332*	lb.	.35	.39
562*	lb.	.24	.28
662* and 662-BPA	lb.	.24	.28
532 and 632*	lb.	.35	.39
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¼
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¾
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	——	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0440	.0630
PX-104* (dms.)	lb.	.28	.30½
PX-108* (dms.)	lb.	.23½	.26
PX-138* (dms.)	lb.	.23½	.26
PX-208* & 238* (dms.)	lb.	.35	.37½
PX-404* (dms.)	lb.	.65½	.67½
PX-438* (dms.)	lb.	.57	.59
PX-800* (dms.)	lb.	.32¼	.34¼
PX-917* (dms.)	lb.	.32½	.35
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
Resin C*	lb.	.0225	.0310
731D	lb.	.17½	.18¾
Resinex*	lb.	.03¾	.05½
L-4*	lb.	.02¼	.04¼
Rexflex*	lb.	——	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	——	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¾
SP Resins	lb.	.34¼	.34¾
Santicizer B-16*	lb.	.46¾	.47¾
E-15*	lb.	.53	.54
M-17*	lb.	.44	.45
No. 140*	lb.	.35	.36
No. 141*	lb.	.36½	.37½
No. 160*	lb.	.27½	.29
No. 602*	lb.	——	.28½
No. 603*	lb.	.27	——
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58½	.61½
DOS*	lb.	.59¼	.62¼
IXA*	lb.	.32	.35
KA*	lb.	.34	.36¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Staybelite Resin	lb.	.13¾	.15
Sunny South Burgundy Pitch*	lb.	.123	.1285
Rosin Oil*	gal.	.605	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	——	.33
Synthetic Revertant Oil	lb.	—	
Tarpine	lb.	.035	.050

PLASTICIZERS & SOFTENERS (Cont'd)

Terpene A*	gal.	——	.65
Tetraflex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.69
TP-95*	lb.	.65	.75
Transphalt Resins*	lb.	.03¾	.05¾
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.35	.36
Triphenyl Phosphate	lb.	.41½	.43½
Turgum S*	lb.	.1410	.1510
Turgum SB*	lb.	.09½	.10½
Turpol NC-1200*	lb.	.67	.70
NC-1300*	lb.	——	.50
Vistac No. 1*	gal.	1.00	1.21
P*	lb.	.18	.18½
Vopcolene 50*	lb.	——	.31
Witcizer 100*	lb.	.26	.27
200*	lb.	.22¼	.25¼
300*	lb.	.30	.33½
312*, 313*	lb.	.28	.31½
412*	lb.	.42½	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.25½	.26½
Refined (dms.)	lb.	——	.18½
Castorwax*	lb.	.25	.31
Dutrex 7*	lb.	.12	.20
ELA*	lb.	——	.82
Foamnix*	lb.	.60	1.50
Hydrofol Glycerides 200*	lb.	.15½	.19¾
Kenflex N*	lb.	.19	.26
Maleic Anhydride	lb.	——	.27
Millrex*	lb.	——	.15
Nadic Anhydride	lb.	——	.75
Polycin*	lb.	——	.24½
R-B-H Resin 510*	lb.	.19	.26
530*	lb.	.25	.32
STAYB*	lb.	.25	.45
Thiomalic Acid	lb.	——	3.50
Webnix*	lb.	1.25	2.00
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾	.21
Alcogum*	lb.	.08½	.24
Alpha Protein	lb.	——	.23
Aroostoocrat*	lb.	——	.07½
Carob Bean Flour	lb.	——	.50
Casein	lb.	.22	.35
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	lb.	.44	.47
Gum Arabic	lb.	——	.23
Karaya Gum	lb.	——	.35
Locust Bean Gum	lb.	——	.50
Modicol VD*	lb.	.13½	.15½
Prosern*	lb.	——	.06
Stablex B*	lb.	.50	.95
K*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34	.35
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Blend No. 27 Oil	gal.	.35	.42
Burco RA*	lb.	.05	.081
BWH-1*	gal.	.16	.17
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	——	.21½
C-42* (t.c.)	gal.	——	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	——	5.20
Liquid 50% (t.c.)	cwt.	——	2.90
Solid 76% (c.l., dms.)	cwt.	——	4.80
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	——	.27
E-5* (t.c.)	gal.	——	.25
Flake Calcium Chloride (77-80%)	ton	——	31.00
(94-97%)	ton	——	39.80
Gensol No. 6* (t.c.)	gal.	——	.42
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07¾
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Nucom* (t.c.)	gal.	——	.42
Pitt-Consol 500 (dms.)	lb.	.25	.25½
500 NS* (dms.)	lb.	.33	.33½
640 (dms.)	lb.	.42	.42
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
Q Oil* (t.c.)	gal.	——	.286
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	——	.51
RR-10*	lb.	——	.37
Soda Ash (c.l., bags)	cwt.	——	1.85
Solvenol No. 1	gal.	.50	.67
No. 2	gal.	.41	.62
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0850	.1625
Continental A*	lb.	.0850	.1625
Kosmobile HM (and S-66)	lb.	.0850	.1625
Micronex Standard*	lb.	.0850	.1625
Spheron 6*	lb.	.0850	.1625
Texas M*	lb.	.0850	.1625
Witco No. 1*	lb.	.0850	.1625

Channel, Easy Processing (EPC) (bags)

Collocarb*	lb.	.0710	.1485
Continental AA*	lb.	.0850	.1625
Kosmobile 77*	lb.	.0850	.1625
Micronex W-6*	lb.	.0850	.1625
Spheron 9*	lb.	.0850	.1625
Texas E*	lb.	.0850	.1625
Witco No. 12*	lb.	.0850	.1625
Wyex EPC*	lb.	.0850	.1625

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3500
Dixie 5 Dustless*	lb.	.1400	.2250
Kosmos-Dixie BB*	lb.	.2600	.3500
Texas MC-74-BD*	lb.	.2600	.3500
Voltex*	lb.	.2600	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1550
Continex CF*	lb.	.1100	.1700
Kosmos CF*	lb.	.0925	.1600
Shawinigan Acetylene Black*	lb.	——	.1900
Vulcan C*	lb.	.1100	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1350
Continex FEF*	lb.	.0675	.1350
Dixie 50*	lb.	.0675	.1350
Kosmos 50*	lb.	.0675	.1350
Philblack A*	lb.	.0675	.1350
Statex M*	lb.	.0675	.1350
Sterling SO*	lb.	.0675	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1400
Sterling 99*	lb.	.0725	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1275
Continex GPF*	lb.	.0600	.1275
Dixie 35*	lb.	.0600	.1275
Kosmos 35*	lb.	.0600	.1275
Statex G*	lb.	.0600	.1275
Sterling V*	lb.	.0600	.1275
V (Non-Staining)	lb.	.0600	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1450
Continex HAF*	lb.	.0775	.1450
Dixie 60*	lb.	.0775	.1450
Kosmos 60*	lb.	.0775	.1450
Philblack O*	lb.	.0775	.1450
Statex R*	lb.	.0775	.1450
Vulcan 3*	lb.	.0775	.1450

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0625	.1300
Dixie 40*	lb.	.0625	.1300
Kosmos 40*	lb.	.0625	.1300
Modulex HMF*	lb.	.0625	.1300
Statex 93*	lb.	.0625	.1300
Sterling L* and LL*	lb.	.0625	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1250
Dixie 20*	lb.	.0575	.1250
Essex SRF*	lb.	.0575	.1250
Furnex*	lb.	.0575	.1250
Gastex*	lb.	.0625	.1350
Kosmos 20*	lb.	.0575	.1250
Pelletex* and NS*	lb.	.0575	.1250
Regal*	lb.	.0575	.1250
Shawinigan Acetylene Black*	lb.	——	.1900
Sterling NS* and S*	lb.	.0575	.1250
R*	lb.	.0625	.1350

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace Super Abrasion (SAF) (bags)

Aromax SAF	lb.	.1150	.1825
Dixie 85	lb.	.1150	.1900
Kosmos 85	lb.	.1150	.1900
Philblack E*	lb.	.1150	.1900
Statex 160*	lb.	.1150	.1900
Vulcan 9*	lb.	.1150	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925	.1600
Continex ISAF*	lb.	.0925	.1600
Dixie 70*	lb.	.0925	.1600
Kosmos 70*	lb.	.0925	.1600
Philblack I*	lb.	.0925	.1600
Statex 125*	lb.	.0925	.1600
Vulcan 6*	lb.	.0925	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150	.1900
Vulcan SC*	lb.	.1800	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	——	.0625
Sterling FT (c.l.)	lb.	——	.0625

Thermal, Medium (MT) (bags)

Sheilblack*(†)	lb.	——	.0250
Sterling MT (c.l.)	lb.	——	.0450
MT Non-Staining (c.l.)*	lb.	——	.0550
Thermax (c.l.)*	lb.	——	.0450
Stainless (c.l.)	lb.	——	.0550

Specialty Blacks (Awaiting Classification)

Neotex 100*	lb.	.0775	.1450
Neotex 130*	lb.	.0925	.1600
Neotex 150*	lb.	.1150	.1900
Regal 300*	lb.	.0775	.1450
Regal 600*	lb.	.0925	.1600

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66	1.25
D. C. Silica (pelletized)*	lb.	1.45	1.65
Hi-Sil 210* and 233*	lb.	.08¼	.09¾
Santocel*	lb.	.62	.64
Ultrasil VN-3*	lb.	.35	.65
Valron Estersil*	lb.	2.00	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40	.50
Cato 2* (100 lb. bag)	lb.	17.00	——
Darex Copolymer No. 3*	lb.	.47	.49
43G*	lb.	.39	.41
Darex Copolymer Latex No. 3-L	lb.	.41½	.46
Durez 12687 (and 12707)*	lb.	.36½	.40
Durez 13355*	lb.	.27½	.31½
Dymerex Resin	lb.	.15¾	.17
Good-rite Resin 2007*	lb.	.36	.38
2057*	lb.	.30	.31
Hystron*	lb.	.39	.41
Kralac A-EP*	lb.	.39	.41
Lampblack	lb.	——	.12
Marbon 8000*	lb.	.36	.43
Marmix*	lb.	.35	.43
Mistron Vapor*	lb.	——	.03½
HGO 55*	lb.	——	.05
Pliolite Latex 150*	lb.	.35	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33	.57
Pliolite NR*	lb.	.93	.95
S6B*	lb.	.36	.43
Polyco 220*	lb.	.18¼	.19¼
Poly-Phen 201-C; 218-C	lb.	.27½	.29
202-C	lb.	.36	.37½
Polypol S-70*	lb.	.25	.26

RETARDERS

Akron Benzoic Acid TBAO 2*	lb.	.41	.43
Dutch Boy Normasal*	lb.	——	.46
ESEN*	lb.	.39	.41
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.68	.70
PD*	lb.	.39	.41
W*	lb.	——	.46
Retardex*	lb.	.46	.46
TCM-25*	lb.	.60	.70
Wiltrol P	lb.	.37	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	55.00	62.00
Hard Hydrocarbon Solid (dms.)	lb.	.03	.06
Granular (bags)	lb.	.03¼	.06¼
Herron Flake*	ton	——	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	57.00	70.00

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.36
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	.33½	.36
Neophax*	lb.	.17	.27
Car-Bel-Rex A and C*	lb.	——	.126
White	lb.	.15	.26
670 Brown	lb.	.14¼	.14¾

Miscellaneous Rubber Substitutes

Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	——	.62
No. 1198*	lb.	.46¾	.49¾
Tysonite*	lb.	.30	.30¾

SOLVENTS

Acetone (dlvd.)	lb.	.09½	.11
Amsco Lactol Spirits* (t.c.)	gal.	——	.20
Naphthol Spirits*	gal.	——	.19
Mineral Spirits*	gal.	——	.18
Rubber Solvent* (t.c.)	gal.	——	.19
Solv A* (t.c.)	gal.	——	.22
Solv A-80* (t.c.)	gal.	——	.23½
Solv B* (t.c)	gal.	——	.28
Solv B-90* (t.c.)	gal.	——	.31
Solv D* (t.c.)	gal.	——	.30
Solv E*	gal.	——	.30
Solv F*	gal.	——	.30
Solv F-80*	gal.	——	.32
Solv G*	gal.	——	.36
Special Naphtholite* (t.c.)	gal.	——	.19
Special Textile Spirits*	gal.	——	.20
Super Hi-Flash Naphtha*	gal.	——	.34
Super Naphtholite*	gal.	——	.19
Textile Spirits* (t.c.)	gal.	——	.20
Amyl Chlorides, Mixed (t.c.l.) (dms.)	lb.	——	.11
Benzol 90%	gal.	.36	.40
Butyl Acetate	lb.	.17	.18½
Butyl Alcohol	lb.	.17	.19½
Secondary (dlvd.)	lb.	.15	.16½
Tertiary (dlvd.)	lb.	.15	.16½
Carbon Bisulfide, Tech.	lb.	.07	.08½
Carbon Tetrachloride	lb.	.10¾	.14¼
Cosol 1*	gal.	.37	.43
2*	gal.	.42	.48
Cyclohexane	gal.	.77	110.00
85% (c.l.) (dms.)	gal.	——	.56
Cyclohexanone	lb.	.31	.34½
Diacetone, Pure (dlvd.)	lb.	.15½	.17
Dichlorethyl Ether (dms.)	lb.	.15½	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	——	.06
Dicom*	gal.	——	.55
Halowax Oil*	lb.	.28	.41
Heptanes* (t.c.)	gal.	——	.1609
Hexanes (t.c.)	gal.	——	.1584
Isobutyl Acetate	lb.	.15¼	.16¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	.72
Ether, Ref. (dlvd.)	lb.	.09½	.11
Mersol*	gal.	.43	.79
Mesityl Oxide (dlvd.)	lb.	.15	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	.72
Methyl Chloride	lb.	——	.12¾
Methyl Ethyl Ketone	lb.	.15	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18½
Methylene Chloride	lb.	——	.12½
N-5 Pentane Mix* (t.c.)	gal.	——	.13½
N-6 Hexanes* (t.c.)	gal.	——	.14½
N-7 Hexanes* (t.c.)	gal.	——	.13½
Nelio Dipentene	gal.	.41	.62
Penetrell*	gal.	.41	.42
Perchlorethylene	lb.	.11¾	.15¼
Petrolene* (t.c.)	gal.	——	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb.	——	.11¾
Alcohol (t.c., dlvd.)	lb.	——	.11
Pyridine, Refined	lb.	.69½	.70
Quinoline	lb.	.50¾	.51¾
Rubber Solvent (t.c.)	gal.	——	.16
Rubsol (t.c.)	gal.	——	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	——	.16
C (Heptanes)* (t.c.)	gal.	——	.16¼
R (Rubber Solvent)*	gal.	——	.1390
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	——
Sunny South DD Dipentine*	gal.	.41	.62
Sunny South DD Pine Oil*	lb.	——	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	——	.38
Toluol (t.c.)	gal.	.25	.25
Trichlorethane	lb.	——	.12¾
Trichlorethylene	lb.	.12	.16¾
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	——	.174
5* (dms.)	gal.	——	.199
7* (t.c.)	gal.	——	.164
2-50 W Hi-Flash*	gal.	——	.41
Xylol (t.c.)	gal.	.29	.30

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.95
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*; CH-201*	lb.	.60	.65
E-82*	lb.	.90	.95
JCX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Amioca 50* 85* (bags)	lb.	11.11	11.26
Barca 10*	lb.	.65	.70
Barium Stearate	lb.	.41	.46
Basic Silicate White Lead	lb.	.16½	.17½
Cadmium Ricinoleate	lb.	——	2.00
Calcium Ricinoleate	lb.	——	.55
Dutch Boy DS-207*	lb.	——	.54
B*	lb.	——	.32½
Tribase*	lb.	——	.27½
Dythal*	lb.	——	.39½
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	——	.98
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51
Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.68	.70
1-V-7*	lb.	.70	.72
2-V-4*	lb.	.85	.87
2-V-8*	lb.	1.31	1.33
5-V-1*	lb.	.41	.43
6-V-1B*	lb.	——	.55
6-V-2*	lb.	.62	.72
6-V-6*	lb.	.62	.72
6-V-10*	lb.	.62	.72
7-V-2*	lb.	1.00	1.10
8-V-1*	lb.	.89	.99
8-V-100*	lb.	.89	.99
9-V-1*	lb.	.77	.87
12-V-5*	lb.	.73	.75
24-V-1*	lb.	1.10	1.12
128-V-5*	lb.	.86	.88
Istabelan No. 115 Liquid	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Kosol* (50 lb. bags)	lb.	19.00	——
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark A*	lb.	2.80	3.15
C*	lb.	.81	.84
E*	lb.	.72	.75
GS*	lb.	.77	.80
LL*	lb.	.59	.62
KCB*	lb.	.59	.62
M*	lb.	.59	.62
PL*	lb.	.62	.65
TT*	lb.	.72	.75
WS*	lb.	.97	1.00
X*	lb.	2.50	2.75
XI*	lb.	.87	.90
XV*	lb.	.84	.87
XX*	lb.	.57	.60
33*; 34*; 35*	lb.	.97	1.00
Metasap 613-A*	lb.	——	.69
613-B*	lb.	——	.84
613-C*	lb.	——	1.06
621*	lb.	——	.88
624*	lb.	——	.75
633*	lb.	——	.75
635*	lb.	——	.45
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nonisol 100	lb.	.38	.43
Sodium Silicates 41°/1:3.2	cwt.	1.20	2.30
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	——	.70
E6B*	lb.	——	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	——	.60
OM-10*	lb.	——	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	——	.70
Stayrite 10*	lb.	.36	.41
P-10*	lb.	.43	.45
15*	lb.	.55	.57
20*	lb.	.41	.46
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.70	.72
71*	lb.	.90	.92
75*	lb.	.61	.63
76*	lb.	.53	.55
80*; 90*	lb.	.70	.72
95*	lb.	.70	.72
229*	lb.	.61	.63

STABILIZING AGENTS (Cont'd)

Vanstay AC* (dms.)	lb.	.45	.48
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	1.02	1.05
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
HTE* (dms.)	lb.	.80	.83
HTF* (dms.)	lb.	.77	.80
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RR*; RRZ* (dms.)	lb.	.59	.62
RZ-25* (dms.)	lb.	.66	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	——	1.85
Processinfi Stiffener 710*	lb.	.88	.90
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	——	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	——	1.67
Rose Sunproofing Waxes*	lb.	——	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.32	.33
Improved*	lb.	.25	.26
Super*	lb.	.41	.42
Jr.*	lb.	.22	.23
Tonox*	lb.	.54	.56

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	——	.81
G*	lb.	——	.21
MDL*	lb.	——	.33
ME*	lb.	——	.82
NS*	lb.	——	.60
SMO*	lb.	——	.50
WAQ*	lb.	——	.22
Emulphor EL-620*	lb.	——	.40
EL-719*	lb.	——	.58
ON-870*	lb.	——	.55
Hyonics*	lb.	——	.28¾
Igepal CA-630	lb.	——	.29
CO-630; CO-730*	lb.	——	.29
CO-850; CO-880*	lb.	——	.29
Igepon CN-42*	lb.	——	.25
T-33*	lb.	——	.21
T-51*	lb.	——	.13½
T-77*	lb.	——	.49
Kessco 50201*	lb.	——	.44½
50203*	lb.	——	.44¼
18201*	lb.	——	.32
18203*	lb.	——	.35½
Lipal 9-N.* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Nacconol NR (dlvd.)	lb.	.14½	.16
NRSF (dlvd.)	lb.	.40½	.45
Phosphonol 0* (dms.)	lb.	.40	.41
H* (dms.)	lb.	.80	.81
N* (dms.)	lb.	.50	.51
T* (dms.)	lb.	.60	.61
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	——	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
Arcco A-2t*	lb.	.18	.19
Gunaweld Polymer No. 780*	lb.	——	.24
Galex* (dms.)	lb.	.17¼	.20
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	1.13	1.15
Liquid Rubber Flux*	lb.	——	.14
Nacconol NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	——	16.00
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
PR-162 Resin Emulsion	lb.	.82	——
Resin V	lb.	——	.23½
SP Resins*	lb.	.29	.41¼
ST-5000 Series*	lb.	.22¼	.23¼
Synthol* (dms.)	lb.	.26	.30¼
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	——	.45
Zirex* (c.l.)	cwt.	——	15.25
82 Resin Solid (dms.)	lb.	.13½	.14½
84 Resin Solid (dms.)	lb.	.13½	.14½

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	——	.31
PA-15*	lb.	.13½	.17½
PA-15-B*	lb.	.13½	.17½
Betanol* (dms.)	lb.	.70	.95
CM Starch* (100 lb. bags)	lb.	26.85	——
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (50 lb. bags)	lb.	9.19	——
Melojel* (100 lb. bags)	lb.	6.71	——
Modicol VD*	lb.	.13¾	.15¾
VE*	lb.	.13¾	.16¾
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	——
T	lb.	1.10	1.50
R	lb.	1.60	2.00
40C	lb.	.55	.75
UC XK-1960*	lb.	5.50	——

Selenium

Vandex*	lb.	——	6.50
VA-7*	lb.	——	.50

Sulfur

Blackbirdd* (c.l.)	cwt.	——	2.90
Cloud* (c.l.)	cwt.	——	2.85
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16
Devil A* (c.l.)	cwt.	——	2.45
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	——	.39
Mist* (Wettable) (c.l.)	cwt.	——	4.05
Spider* (c.l.)	cwt.	——	2.85
Star* (c.l.)	cwt.	——	4.90
Sulfasan R*	lb.	——	1.55
Tire* (c.l.)	cwt.	——	2.45
Tube* (c.l.)	cwt.	——	4.90
Vultac 2*	lb.	.47	.74
3*	lb.	.51	.78

VULCANIZING AGENTS (Cont'd)

Tellurium

Telloy*	lb.	——	5.00

WETTING AGENTS

Advawet No. 10*	lb.	——	.17
No. 33*	lb.	——	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70

WETTING AGENTS (Cont'd)

Alrosol* (dms.)	lb.	.36	.40
Alrosperse*	lb.	——	.18
Alrowet D 65*	lb.	.31	.34
Anhydrol 6990* 6991*	lb.	.51	.56
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	——	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Hyonic PE-90*	lb.	.25	.27
PE-100*	lb.	.25	.27
Kessco E-122* (dms.)	lb.	——	.45
18201*	lb.	——	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	——	.29¼
Modicol N*	lb.	.42½	.44½
S*	lb.	.30¾	.32¾
Nacconol A* (dlvd.)	lb.	——	.52
NRSF* (dlvd.)	lb.	.40½	.45
SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nekal WS-25	lb.	——	.38
WS-99	lb.	——	.95
Orvus AB Granules*	lb.	.16¼	.17¼
Parnol*	lb.	——	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3 Paste*	lb.	.26	.30
Sorapon SF-73*	lb.	——	.18
SF-78*	lb.	——	.30
Sorbit P*	lb.	.29	.31
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37¼
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	——	.15
Vultamol*	lb.	——	.17½
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	——	.11
Chiplac Paint	gal.	1.15	5.00
Copper Inhibitor No. 50*	lb.	——	1.20
D-Tac*	lb.	——	.22
Elastopar	lb.	2.05	2.07
2-Ethyl Hexanol	lb.	.23¾	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates*	lb.	.75	4.50
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	——
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	——	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
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No. 3* & No. 4*	gal.	1.95	2.00

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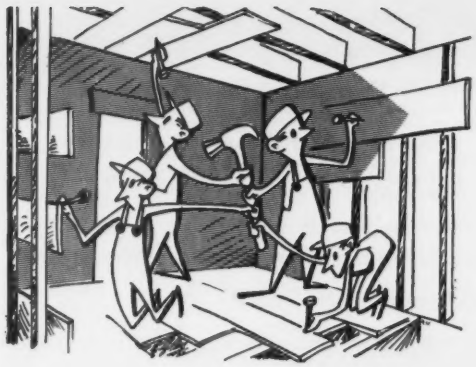

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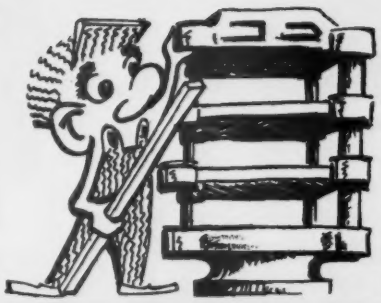

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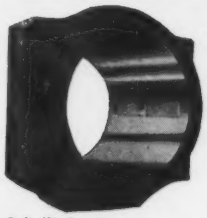

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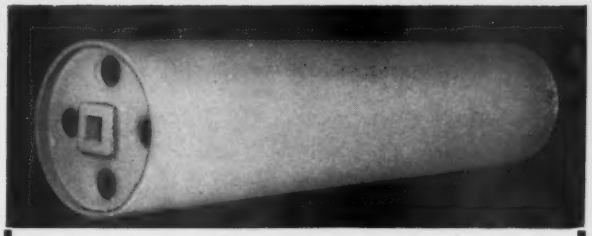

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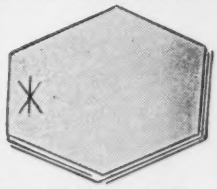

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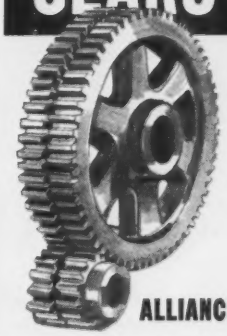

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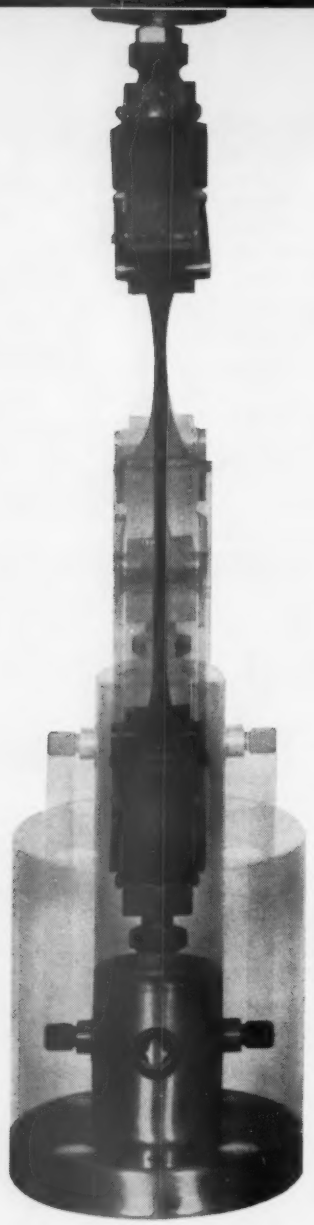

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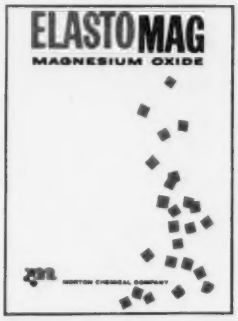

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